

To:

Anthony J. Quigley

Attn: Ken Eng

From:

Maureen M. Addis MA mo

Subject:

Pavement Design Approval

Date:

April 21, 2017

Route: IL 58

Job No.:

D-91-394-15

Section: 583-R

Contract No.: 62B16

County: Cook

Target Letting: June 2017

Limits: at Wolf Road (Cumberland Circle)

We have reviewed the pavement design for the above referenced project which was submitted on April 5, 2017. The scope of the project is reconstruction of the existing traffic circle to provide a modern five-legged roundabout.

We concur with the District's opinion this is a "special design" as the roundabout is a "high-stress" intersection; and as such, a life cycle cost analysis is not necessary.

In summary, the approved pavement design is as follows:

IL 58 / Roundabout and Truck Apron

9.75" Jointed PCC Pavement w/ tied Curb & Gutter 12" Aggregate Subgrade Improvement

Wolf Road

8.25" Jointed PCC Pavement w/ tied Curb & Gutter 12" Aggregate Subgrade Improvement

Broadway Street and State Street

8" Jointed PCC Pavement w/ tied Curb & Gutter 12" Aggregate Subgrade Improvement

If you have any questions, please contact Mike Brand at (217) 782-7651.

To: Maureen Addis

Attn: Michael Brand

From: Jose A. Dominguez

By: Ojas Patel

Subject: Pavement Analysis*

Date: April 5, 2017

*Route: Illinois Route 58

County: Cook

Limits: at Wolf Road (Cumberland Circle)

Contract No.: 62B16 Job No.: D-91-394-15

Section: 583-R

Current target: 06CY17

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. NOTE: Review is not required for

State Street as this roadway is under local jurisdiction and the State Street pavement design is included for your information. The following is the scope of

the project:

Reconstruction of the existing traffic circle at IL 58 at Wolf Road to provide a modern 5-legged roundabout.

A 20-year pavement analysis was performed for the above roundabout and roadway segments. This intersection is a "High Stress" location since the design lane as well as turning MU ADT exceeds 200 vehicles. As such, this pavement design will be classified as a "Special Design" per BDE Figure 54-1.A. A mechanistic-rigid pavement design is recommended for ease of construction due to the complex geometry and varying cross sections of this roundabout. In addition, with this project located in an urban setting, PCC pavement is desirable as it will have lower future maintenance needs than asphalt and will result in less disruption to traffic. The recommended pavement is:

IL 58/Roundabout & Truck Apron

Reconstruction
PCC Curb and Gutter (Tied)
9 ¾" PCC Pavement, (Jointed)
12" Aggregate Subgrade Improvement
4

Wolf Road

Reconstruction
PCC Curb and Gutter (Tied)
8 1/4" PCC Pavement, (Jointed)²
12" Aggregate Subgrade Improvement⁴

M. Addis April 5, 2017 Page Two

Broadway Street

Reconstruction
PCC Curb and Gutter (Tied)
8" PCC Pavement, (Jointed)³
12" Aggregate Subgrade Improvement⁴

State Street (Local Jurisdiction)5

Reconstruction
PCC Curb and Gutter (Tied)
8" PCC Pavement, (Jointed)³
12" Aggregate Subgrade Improvement⁴

¹Designer Note 1: Use pay item 42000416, PORTLAND CEMENT CONCRETE PAVEMENT 9 ¾" (JOINTED), paid for in square yards. When variable width lanes (12'-18') exceed 14 feet in width a centerline joint should be added to avoid longitudinal cracking; see Bureau of Design Standard 53.

²Designer Note 2: Use pay item 42000306, PORTLAND CEMENT CONCRETE PAVEMENT 8 ¼" (JOINTED), paid for in square yards. Transverse contraction joints should be reduced to a maximum of 12 ½ foot spacing for 8 ¼" PCC pavement. When variable width lanes (12'-18') exceed 14 feet in width a centerline joint should be added to avoid longitudinal cracking; see Bureau of Design Standard 53.

³Designer Note 3: Use pay item 42000301, PORTLAND CEMENT CONCRETE PAVEMENT 8" (JOINTED), paid for in square yards. Transverse contraction joints should be reduced to a maximum of 12 foot spacing for 8" PCC pavement. When variable width lanes (12'-18') exceed 14 feet in width a centerline joint should be added to avoid longitudinal cracking; see Bureau of Design Standard 53.

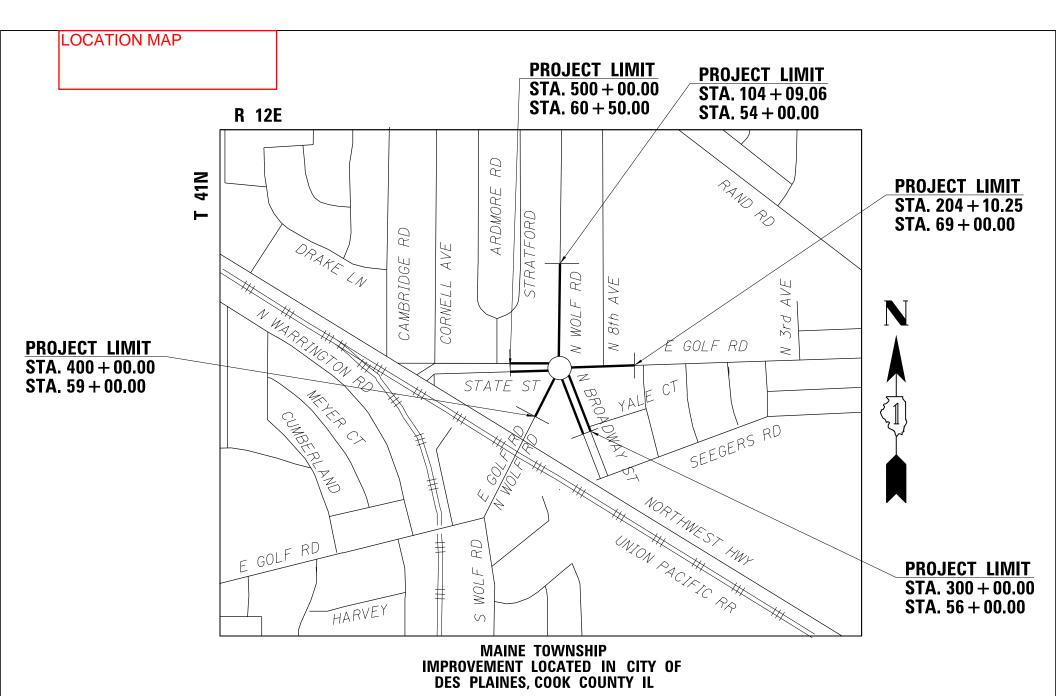
⁵Designer Note 5: Use pay item 30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12", paid in square yards.

⁶Designer Note 6: State Street is subject to local jurisdictional approval and concurrence.

If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

Jose A. Dominguez, P.E.

Project Support Engineer



LOCATION MAP

NOT TO SCALE

Printed: 10/24/2017 (Enter Data in Gray Shaded Cells)

Route: IL 58 Comments: IL 58 @ Wolf Rd (Roundabout)
Section: 583-R

County: Cook Design Date: 02/
Location: at Wolf Road (Roundabout) Modify Date:

02/10/2017 <-- BY

Facility Type Other Marked State Route

--- BY ADT Year

 Current:
 29,700
 2015

 Future:
 33,000
 2040

of Lanes = 4

Structural Design Traffic

Road Class: I

Subgrade Support Rating (SSR): Poor
Construction Year: 2018

20

FLEXIBLE PAVEMENT

Design Period (DP) =

Minimum Actual Actual %of % of ADT in ADT ADT Total ADT Design Lane PV = 0 28,777 91.6% 250 SU = 1,539 4.9% S = 45% MU = 750 1,100 3.59 M = 45% 31,416 Struct. Design ADT = (2028)

years

TRAFFIC FACTOR CALCULATION

RIGID PAVEMENT

Cpv = 0.15 Cpv = 0.15 Csu = 132.5 Csu = 143.81Cmu = 482.53 Cmu = 696.42

TF flexible (Actual) = 6.64 (Actual ADT) TF rigid (Actual) = 8.91 (Actual ADT)

TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C) TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS Full-Depth HMA Pavement JPC Pavement Use TF flexible = 6.64 Use TF rigid = 8.91 PG Grade Lower Binder Lifts = PG 64-22 Shoulder or C.&G. (Fig. 53-4.R) Edge Support = Goto Map 9.75 HMA Mixture Temp. = 74.0 deg. F (Fig. 54-5.C) Rigid Pavt Thick. = in. (Fig. 54-4.E) Design HMA Mixture Modulus $(E_{HMA}) =$ 720 ksi (Fig. 54-5.D) Design HMA Strain (ε_{HMA}) = 70 (Fig. 54-5.E) **CRC Pavement** Full Depth HMA Design Thickness = 11.25 in. (Fig. 54-5.F) Use TF rigid = 8.91 Goto Map Limiting Strain Criterion Thickness = in. (Fig. 54-5.I) IBR value = Use Full-Depth HMA Thickness = 8.75 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

	RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS							
	HMA Over	Unbonded Concrete Overlay						
	Use TF flexible =	6.64		Review 54-4.03 for limitations and				
	HMA Overlay Design Thickness =	8.50	in. (Fig. 54-5.U)	special considerations.				
Goto Map	Limiting Strain Criterion Thickness =		in. (Fig. 54-5.V)	apostal contractations.				
	Use HMA Overlay Thickness =	999.00	inches	JPCP Thickness = NA inches				

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

ĺ	Class I Roads	Class II Roads	Class III Roads	Class IV Roads
	4 lanes or more	2 lanes with ADT > 2000	2 Lanes	2 Lanes
	Part of a future 4 lanes or more	One way Street with ADT <= 3500	(ADT 750 -2000)	(ADT < 750)

	Min. Str. Design Traffic (Fig 54-2.C)					
Facility Type	PV	SU	MU			
Interstate or Freeway	0	500	1500			
Other Marked State Route	0	250	750			
Unmarked State Route	No Min	No Min	No Min			

	1	Traffic Factor ESAL Coefficients					
	Rigid (Fig. 54-4.C)	Flexible (Fig. 54-5.B)				
Class	Csu	Cmu	Csu	Cmu			
	143.81	696.42	132.50	482.53			
II	135.78	567.21	112.06	385.44			
III	129.58	562.47	109.14	384.35			
IV	129.58	562.47	109.14	384.35			

Class	Table for					
One-Way Streets						
ADT	Class					
0 - 3500						
>3501	1					

Class	Table for					
2 or 3	3 lanes					
(not future 4 lane &						
not one-	way street)					
ADT	Class					
0 - 749	IV					
750 - 2000	III					
>2000						

	Design L	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)						
		Rural	Urban					
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 09/05/2013) Printed: 10/24/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA	PAVEME	<u>NT</u>						Standard Design
ROUTE SECTION COUNTY LOCATION		at ˈ	Wolf Road (IL 58 583-R Cook (Roundabout)				
FACILITY TYPE			NON-	INTERSTATE				
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	HMA HMA Total Width	Left Right of Paved Shou	lders	3 4 2 12 0 0	FT ==> CL LANES EP FT FT FT	0.16	Miles	
PAVEMENT THICKNESS SHOULDER THICKNESS POLICY OVERLAY THICKN				11.25 8.00 2.25	IN		IN MAX Standard Design	
FLEX PAVEMENT TRAF	FIC FACTOR	RS		MINIMUM		ACTUAL		USE
				3.56		6.64		6.64
HMA COST PER TON						LINIT DDICE		ead Me!
HMA COST PER TON HMA SURFACE HMA TOP BINDER HMA LOWER BINDER HMA BINDER (LEVELING) HMA SHOULDER						VNIT PRICE \$112.21 \$109.43 \$75.43 \$109.43 \$72.00	/ TON / TON / TON / TON	
INITIAL COSTS ITEM		THICKNESS	100	% QUANTITY	UNIT	UNIT PRICE	C	COST_
HMA PAVEMENT (FULL-I HMA SURFACE COURSE HMA TOP BINDER COURS		(11.25")	4533 1.0035 1.0109		SQ YD * TONS TONS	\$56.52 \$112.21	/ TON	\$0 \$0 \$0
HMA LOWER BINDER COURS		(2.25") (7.00")	1.0269	1,825		\$109.43 \$75.43		\$0
HMA SHOULDER CURB & GUTTER		(8.00")	0		TONS LIN FT *	\$72.00 \$30.00		\$0 ~ ,000
SUBBASE GRAN MATL TY	C (TONS)				TONS	\$25.00		\$375
IMPROVED SUBGRADE:	G (1.01.10)	Aggregate	Width = 50.9			*		,635
Reserved For User Supplie Reserved For User Supplie					UNITS UNITS		/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL					SQ YD SQ YD		/ SQ YD \$67 / SQ YD	,995 \$0
Note: * Denotes User Supp	olied Quantity					N INITIAL COST COST PER MILE		,229 ,677
MAINTENANCE COSTS: ITEM		THICKNESS		MATERIAL	т.	UNIT COST		
ROUTINE MAINTENANCE	ACTIVITY						LANE-MILE / YEAR	
HMA OVERLAY PVMT SUI	RF	(2.00")	1.0035	Surface Mix			/ SQ YD	
HMA OVERLAY PVMT HMA SURFACE MIX		(2.25") (1.50")	1.0039 1.0026	Surface Mix		\$9.45	/ SQ YD / SQ YD	
HMA BINDER MIX HMA OVERLAY SHLD	(Year 30)	(0.75")	1.0065	eling Binder Mix Shoulder Mix			/ SQ YD	
HMA OVERLAY SHLD	((2.00")		Shoulder Mix			/ SQ YD	

\$3.00 / SQ YD

\$82.57 / SQ YD

Surface Mix

MILLING (2.00 IN)

PARTIAL DEPTH PVMT PATCH

(Mill & Fill Surf)

PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	\$78.06	/ SQ YD			
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix Shoulder Mix	2.00	\$82.26 \$78.06				
	(Mill & Fill +2.00 ")	Snoulder MIX	2.00					
LONGITUDINAL SHOULDER JOINT CENTERLINE JOINT ROUT & SEAL				\$2.00 \$2.00	/ LIN FT / LIN FT			
RANDOM / THERMAL CRACK ROU	T & SEAL	(100% Rehab = 110.00' / Station	/ Lane)	\$2.00	/ LIN FT			
	FLEXIBLE TOTAL LIFE-CYCLE COST \$536,032							
		FLEXIBLE TOTAL A	NNUAL C	COST PER MILE		\$135,803		

JPCP							PAVEMENT
				IL 58 583-R Cook			TE TION NTY
					Wolf Road (I	at \	TION
				NTERSTATE	NON-I		ITY TYPE
	Miles	0.16	FT ==> CL LANES EP FT FT FT	3 4 2 12 0 0	ulders	Left Right idth of Paved Shoul	ECT LENGTH CENTERLINES LANES EDGES WIDTH - AVERAGE JLDER WIDTH PCC PCC Total Wi
		TIED SHLD		9.75 9.75	JPCP		MENT THICKNESS (RIGID) JLDER THICKNESS
			N	2.50			CY OVERLAY THICKNESS
USE		ACTUAL		MINIMUM		TORS	PAVEMENT TRAFFIC FAC
8.91 JPCP		8.91 evement Type is	The Pa	5.02		Reconstruction	sheet Construction Type is
COST		UNIT PRICE	UNIT	6 QUANTITY	1009	THICKNESS	AL COSTS
\$307,927 \$0 \$0	/ SQ YD	\$67.93 \$22.00 \$19.00	SQ YD SQ YD SQ YD			(9.75") (4.00")	PAVEMENT MENT REINFORCEMENT ILIZED SUBBASE
\$0 \$51,000	/ SQ YD / LIN FT	\$40.00 \$30.00	SQ YD LIN FT	0 1,700			SHOULDERS 3 & GUTTER
\$0 \$32,396	/ TON / SQ YD	\$25.00 \$7.00	TONS SQ YD		Width = 49.0	(~ 0.00") Aggregate	ASE GRAN MATL TY C OVED SUBGRADE:
\$0 \$0	/ UNITS / UNITS		JNITS JNITS				rved For User Supplied Item
\$67,995 \$0	/ SQ YD / SQ YD	\$15.00 \$0.00	SQ YD SQ YD	4,533 0			MENT REMOVAL JLDER REMOVAL
\$459,318 \$116,367		N INITIAL COST COST PER MILE			RIGID CON	ntity	* Denotes User Supplied Qual
		UNIT COST	Т	MATERIAL		THICKNESS	TENANCE COSTS:
-/VEAD	/ LANE-MILI			WATERIAL			TINE MAINTENANCE ACTIVITY
I/ ILAN	/ LAINE-WIL	ψ0.00	0.50				
	/ SQ YD	\$15.62	2.50 2.50		1.0043	(2.50") (2.50")	POLICY OVERLAY POLICY OVERLAY PVMT
	/ SQ YD		1.50	Surface Mix	1.0026	(1.50")	HMA SURFACE MIX
	/ SQ YD		1.00 2.50	Shoulder Mix	1.0069	(1.00")	HMA BINDER MIX POLICY OVERLAY SHLD
	/ SO VD	\$195.00					S A PAVEMENT PATCHING
	/ SQ YD	\$150.00 \$150.00 \$145.00					S B PAVEMENT PATCHING S C SHOULDER PATCHING
		\$79.43 \$85.71	1.50 2.50	Surface Mix Surface Mix		· ·	IAL DEPTH PVMT PATCH (M IAL DEPTH PVMT PATCH (M
						ROUT & SEAL	GITUDINAL SHOULDER JOINT
	/ LIN FT	\$2.00					
	/ LIN FT / LIN FT / LIN FT	\$2.00					ERLINE JOINT ROUT & SEAL ECTIVE TRANSVERSE CRACI

		_	JPCP	НМА	
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$459,318	\$409,229	
		ANNUAL COST PER MILE	\$116,367	\$103,677	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$75,268	\$126,803	
		ANNUAL COST PER MILE	\$19,069	\$32,125	
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$534,586	\$536,032	
TOTAL	LIFE-CICLE COST	ANNUAL COST PER MILE	\$135,436	\$135,803	
LIFE-CYCL	E COST ANALYSIS	S: FINAL SUMMARY			
LIFE-CYCL		S: FINAL SUMMARY	JPCP	\$135,436	
LOWEST COST OPTI		S: FINAL SUMMARY TYPE / PERCENTAGE	JPCP HMA	\$135,436 \$135,803	0.3%

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7 C

г	igui	e 5	4-7	.0	
STA	ND	۱RD	DE	SIGN	ı

		STA	NDARD DES	SIGN				
MAINTENANCE COSTS:	ITEM		%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5								
TEAR 3	LONG SHLD JT R&S		100.00%	1.700	LIN FT	\$2.00	\$3,400	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$5,100	
	RNDM / THRM CRACK R&S		50.00%	1,870	LIN FT	\$2.00	\$3,740	
	PD PVMT PATCH M&F SURF		0.10%	5	SQ YD	\$82.57	\$413	
		PWFn =	0.8626		PW =	0.8626 X	\$12,653	\$10,915
YEAR 10								
	LONG SHLD JT R&S		100.00%	1,700	LIN FT	\$2.00	\$3,400	
	CNTR LINE JOINT R&S		100.00%	2,550	LIN FT	\$2.00	\$5,100	
	RNDM / THRM CRACK R&S		50.00%	1,870	LIN FT	\$2.00	\$3,740	
	PD PVMT PATCH M&F SURF		0.50%	23	SQ YD	\$82.57	\$1,899	
		PWFn =	0.7441		PW =	0.7441 X	\$14,139	\$10,521
YEAR 15	5							
	MILL PVMT & SHLD 2.00"		100.00%	4,533	SQ YD	\$3.00	\$13,599	
	PD PVMT PATCH M&F ADD'L	2.00"	1.00%	45	SQ YD	\$82.26	\$3,702	
	HMA OVERLAY PVMT 2.00"		100.00%	4,533	SQ YD	\$12.61	\$57,171	
	HMA OVERLAY SHLD 2.00 "		100.00%	0	SQ YD	\$8.06	\$0	
		PWFn =	0.6419		PW =	0.6419 X	\$74,472	\$47,801
YEAR 20								
	LONG SHLD JT R&S		100.00%	1,700	LIN FT	\$2.00	\$3,400	
	CNTR LINE JOINT R&S		100.00%	2,550	LIN FT	\$2.00	\$5,100	
	RNDM / THRM CRACK R&S		50.00%	1,870	LIN FT	\$2.00	\$3,740	
	PD PVMT PATCH M&F SURF		0.10%	5	SQ YD	\$82.57	\$413	
		PWFn =	0.5537		PW =	0.5537 X	\$12,653	\$7,006
YEAR 25	5							
	LONG SHLD JT R&S		100.00%	1,700	LIN FT	\$2.00	\$3,400	
	CNTR LINE JOINT R&S		100.00%	2,550	LIN FT	\$2.00	\$5,100	
	RNDM / THRM CRACK R&S		50.00%	1,870	LIN FT	\$2.00	\$3,740	
	PD PVMT PATCH M&F SURF		0.50%	23	SQ YD	\$82.57	\$1,899	
	HMA SD	PWFn =	0.4776		PW =	0.4776 X	\$14,139	\$6,753
YEAR 30	_							
	MILL PVMT & SHLD 2.00"		100.00%	4,533	SQ YD	\$3.00	\$13,599	
	PD PVMT PATCH M&F ADD'L	2.00"	2.00%	91	SQ YD	\$82.26	\$7,485	
	PD SHLD PATCH M&F ADD'L	2.00"	1.00%	0	SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25 "		100.00%	4,533	SQ YD	\$14.08	\$63,812	
	HMA OVERLAY SHLD 2.25 "		100.00%	0	SQ YD	\$9.07	\$0	
		PWFn =	0.4120		PW =	0.4120 X	\$84,896	\$34,976
YEAR 35	5							
	LONG SHLD JT R&S		100.00%	1,700	LIN FT	\$2.00	\$3,400	
	CNTR LINE JOINT R&S		100.00%	2,550	LIN FT	\$2.00	\$5,100	
	RNDM / THRM CRACK R&S		50.00%	1,870	LIN FT	\$2.00	\$3,740	
	PD PVMT PATCH M&F SURF		0.10%	5	SQ YD	\$82.57	\$413	
		PWFn =	0.3554		PW =	0.3554 X	\$12,653	\$4,497
YEAR 40								
	LONG SHLD JT R&S		100.00%		LIN FT	\$2.00	\$3,400	
	CNTR LINE JOINT R&S		100.00%	2,550	LIN FT	\$2.00	\$5,100	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$3,740	
	PD PVMT PATCH M&F SURF	DWE	0.50%	23	SQ YD	\$82.57	\$1,899	C4 224
		PWFn =	0.3066		PW =	0.3066 X	\$14,139	\$4,334
							_	\$126,803
	ROUTINE MAINTENANCE ACTI	VITY		0.64	Lane Miles	0.00	\$0	\$0
_						INTENANCE LIF		\$126,803
45	YEAR LIFE CYCLE	CRFn = 0.040	7852		MAINTEN	ANCE ANNUAL C	OST PER MILE	\$32,125

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

							PRESENT
MAINTENANCE COSTS:	ITEM	%	QUANTITY UNI	IT UNIT CO	ST	COST	WORTH
	_						
YEAR 10							
	PAVEMENT PATCH CLASS B	0.10%	5 SQ \			\$750	
	PWFn =	0.7441		PW = 0.74	41 X	\$750	\$558
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	9 SQ \			\$1,350	
	PWFn =	0.6419		PW = 0.64	19 X	\$1,350	\$867
VEAD 00	1						
YEAR 20	PAVEMENT PATCH CLASS B	2.00%	91 SQ \	VD \$150.0	10	\$12.6E0	
	SHOULDER PATCH CLASS C	0.50%	0 SQ \	·		\$13,650 \$0	
	LONGITUDINAL SHLD JT R&S	100.00%	1,700 LIN I	·		\$3,400	
	CENTERLINE JT R&S	100.00%	2,550 LIN			\$5,400 \$5,100	
	PWFn =	0.5537	2,000 LIIV		37 X	\$22,150	\$12,264
	1 *** 11 =	0.0001			ο, _Λ	ΨΖΖ, 100	Ψ12,204
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	136 SQ \	YD \$150.0	00	\$20,400	
	SHOULDER PATCH CLASS C	1.00%	0 SQ \	YD \$145.0	00	\$0	
	PWFn =	0.4776		PW = 0.47	76 X	\$20,400	\$9,743
YEAR 30							
	PAVEMENT PATCH CLASS B	4.00%	181 SQ \			\$27,150	
	SHOULDER PATCH CLASS C	1.50%	0 SQ \	·		\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,533 SQ \			\$70,814	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0 SQ \			\$0	
	PWFn =	0.4120		PW = 0.41	20 X	\$97,964	\$40,360
YEAR 35	NON-INTERSTATE						
TEAK 33	LONGITUDINAL SHLD JT R&S	100.00%	1.700 LIN I	FT \$2.0	10	\$3,400	
	CENTERLINE JT R&S	100.00%	2,550 LIN			\$5,100	
	RANDOM CRACK R&S	50.00%	1.700 LIN			\$3,400	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,700 LIN	•		\$2,188	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	5 SQ \	•		\$429	
	PWFn =	0.3554	<u> </u>		54 X	\$14,517	\$5,159
						• ,-	11, 11
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	23 SQ \	YD \$150.0	00	\$3,450	
	LONGITUDINAL SHLD JT R&S	100.00%	1,700 LIN I	FT \$2.0	00	\$3,400	
	CENTERLINE JT R&S	100.00%	2,550 LIN I	FT \$2.0	00	\$5,100	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,642 LIN I			\$3,284	
	RANDOM CRACK R&S	50.00%	1,700 LIN I		00	\$3,400	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	23 SQ \			\$1,971	
	PWFn =	0.3066		PW = 0.30	66 X	\$20,605	\$6,317
							\$75,268
	ROUTINE MAINTENANCE ACTIVITY		0.64 Lane	e Miles \$0.0	00	\$0	\$0
				MAINTENANC			\$75,268
45	YEAR LIFE CYCLE CRFn = 0.040	7852	MA	AINTENANCE ANN	UAL CO	ST PER MILE	\$19,069

FLEXIBLE PAVEMENT

0.15

112.06

385.44

0.40

Cpv =

Csu =

Cmu =

TF flexible (Actual) =

	TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)
	NEW CONSTRUCTION	I / RECOI	NSTRUCTION PAVEME	ENT DESIGN CALC	JLATIC	ONS
	Full-De	vement	JP	C Paveme	ent	
	Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g	Use TF rigid =	0.53	
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.
Goto Map	HMA Mixture Temp. =	74.0	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	7.75	in. (Fig. 54-4.E)
	Design HMA Mixture Modulus (E _{HMA}) =	720	ksi (Fig. 54-5.D)			
	Design HMA Strain (ϵ_{HMA}) =	147	(Fig. 54-5.E)	(CRC Pave	ment
	Full Depth HMA Design Thickness =	7.00	in. (Fig. 54-5.F)	Use TF rigid =	0.53	
Goto Map	Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.l)	IBR value =	3	
	Use Full-Depth HMA Thickness =	7.00	inches	CRCP Thickness =	5.50	in. (Fig. 54-4.N)

(Actual ADT)

TRAFFIC FACTOR CALCULATION

TF MUST BE > 60 FOR CRCP

RIGID PAVEMENT

0.15

135.78

567.21

0.53

(Actual ADT)

Cpv =

Csu =

Cmu =

TF rigid (Actual) =

	RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS									
	HMA Over	Unbonded Concrete Overlay								
Goto Map	Use TF flexible = HMA Overlay Design Thickness = Limiting Strain Criterion Thickness =	0.50 4.75	in. (Fig. 54-5.U) in. (Fig. 54-5.V)	Review 54-4.03 for limitations and special considerations.						
	Use HMA Overlay Thickness =	999.00	inches	JPCP Thickness = NA inches						

Class I Roads		Class II Roads			Class III Roads			Roa
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500 (A		2 Lanes (ADT 750 -2000)		2 Lar (ADT <			
	Min. Str.	Design Traffic (Fig	54-2.C)	Ī		Class 1	able for	
Facility Type	PV	SU	MU			One-Wa	y Streets	
Interstate or Freeway	0	500	1500			ADT	Class	
Other Marked State Route	0	250	750			0 - 3500	II	
Unmarked State Route	No Min	No Min	No Min			>3501	1	
Class I II III IV	Csu 143.81 135.78 129.58 129.58	Cmu 696.42 567.21 562.47 562.47	Csu 132.50 112.06 109.14 109.14	Cmu 482.53 385.44 384.35 384.35		,	e 4 lane & vay street) Class IV III	
	120.00	002.11	100111	00 1100		>2000	II	
	Design La	ane Distribution Fa	actors For Stru	uctural Desig	n Traffic (Fig	54-2.B)		
		Rural			Urban			
Number of Lanes	Р	S	М	Р	S	M		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 09/05/2013) Printed: 10/24/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA	PAVEMENT				5	Standard Design
ROUTE SECTION COUNTY LOCATION	a		<mark>3-R</mark> ook			
FACILITY TYPE		NON-INTERSTA	TE			
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	HMA Inside HMA Outside Total Width of Paved Sho		510 FT ==> 0 CL 2 LANES 4 EP 20 FT 0 FT 0 FT	0.10	Miles	
PAVEMENT THICKNESS SHOULDER THICKNESS POLICY OVERLAY THICKN		8	.00 IN .00 IN .25 IN		IN MAX Standard Design	
FLEX PAVEMENT TRAF	FIC FACTORS	MINIM	UM	ACTUAL	USE	
		No Min		0.40	0.40	
					Read Me!	=
HMA COST PER TON HMA SURFACE				UNIT PRICE \$108.39	/ TON	
HMA TOP BINDER				\$106.00		
HMA LOWER BINDER				\$111.85		
HMA BINDER (LEVELING)				\$106.00		
HMA SHOULDER				\$72.00	/ TON	
INITIAL COSTS ITEM	THICKNESS	S 100% QUANT	ITY UNIT	UNIT PRICE	COST	
HMA PAVEMENT (FULL-	DEPTH) (7.00") 2267 2,2	67 SQ YD *	\$43.22	/ SQ YD \$97,965	-
HMA SURFACE COURSE	(2.00") 1.0083 2	56 TONS	\$108.39	/TON \$0	
HMA TOP BINDER COURS	•	,	93 TONS	\$106.00 \$111.95		
HMA LOWER BINDER COL	JRSE (2.75") 1.0469 3	65 TONS	\$111.85	/ TON \$0	
						<u> </u>
HMA SHOULDER CURB & GUTTER	(8.00"		0 TONS 40 LIN FT *	\$72.00		<u> </u>
CORD & GUITER		2,0	40 LIN FI	\$30.00	/LIN F1 \$61,200	
SUBBASE GRAN MATL TY IMPROVED SUBGRADE:		Width = 44.3' 2,5	0 TONS 12 SQ YD	\$25.00 \$7.00	/ TON \$0 / SQ YD \$17,584	
Reserved For User Supplier Reserved For User Supplier			0 UNITS 0 UNITS		/ UNITS \$0 / UNITS \$0	
PAVEMENT REMOVAL SHOULDER REMOVAL		2,2	67 SQ YD 0 SQ YD	\$15.00 \$0.00	/ SQ YD \$34,005 / SQ YD \$0	
Note: * Denotes User Supp		FLEXIBLE C		N INITIAL COST COST PER MILE	\$210,754 \$88,990	
MAINTENANCE COSTS:						
ITEM	THICKNESS	S MATER	IAL T	UNIT COST		
ROUTINE MAINTENANCE	ACTIVITY				LANE-MILE / YEAR	
HMA OVERLAY PVMT SU				\$12.24		
HMA OVERLAY PVMT HMA SURFACE MIX	(2.25" (1.50"		2.25 Mix 1.50	\$13.68 \$9.16	/ SQ YD / SQ YD	
HMA BINDER MIX	(0.75"				/ SQ YD	
HMA OVERLAY SHLD	(Year 30) (2.25") Shoulder	Mix 2.25	\$9.07	/ SQ YD	
HMA OVERLAY SHLD MILLING (2.00 IN)	(2.00") Shoulder	Mix 2.00 2.00		/ SQ YD	
DADTIAL DESTIL DIGITAL	ATOLI		2.00	400.00	400.40	

Surface Mix 2.00

\$82.14 / SQ YD

PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)

PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	\$78.06	/ SQ YD		
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ") (Mill & Fill +2.00 ")	Leveling Binder Mix Shoulder Mix	2.00	\$81.87 \$78.06			
LONGITUDINAL SHOULDER JOINT CENTERLINE JOINT ROUT & SEAL RANDOM / THERMAL CRACK ROU		00% Rehab = 110.00' / Station	/ Lane)	\$2.00 \$2.00 \$2.00	/ LIN FT		
FLEXIBLE TOTAL LIFE-CYCLE COST \$270,072 FLEXIBLE TOTAL ANNUAL COST PER MILE \$114,037							

PCC PAVEMENT	JPCP
ROUTE Broadway Street SECTION 583-R COUNTY Cook LOCATION at Wolf Road (Roundabout)	
FACILITY TYPE NON-INTERSTATE	
PROJECT LENGTH 510 FT = # OF CENTERLINES 0 CL # OF LANES 2 LANES # OF EDGES 4 EP LANE WIDTH - AVERAGE 20 FT SHOULDER WIDTH PCC Inside PCC Outside Total Width of Paved Shoulders 0 FT	
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS JPCP 7.75 IN 7.75 IN	TIED SHLD
POLICY OVERLAY THICKNESS 2.50 IN	
RIGID PAVEMENT TRAFFIC FACTORS MINIMUM	ACTUAL USE
Worksheet Construction Type is Reconstruction The	0.53 0.53 e Pavement Type is JPCP
INITIAL COSTS ITEM THICKNESS 100% QUANTITY UNIT	UNIT PRICE COST
JPC PAVEMENT (7.75") 2,267 SQ YD	\$62.50 / SQ YD \$141,688
PAVEMENT REINFORCEMENT STABILIZED SUBBASE (4.00") 0 SQ YD	\$22.00 / SQ YD \$0 * \$19.00 / SQ YD \$0
PCC SHOULDERS 0 SQ YD CURB & GUTTER 2,040 LIN FT	\$40.00 /SQYD \$0 \$30.00 /LIN FT \$61,200
SUBBASE GRAN MATL TY C (~0.00") 0 TONS IMPROVED SUBGRADE: Aggregate Width = 42.0' 2,380 SQ YD	\$25.00 / TON \$0 \$7.00 / SQ YD \$16,660
Reserved For User Supplied Item 0 UNITS Reserved For User Supplied Item 0 UNITS	\$0.00 / UNITS \$0 \$0.00 / UNITS \$0
PAVEMENT REMOVAL 2,267 SQ YD SHOULDER REMOVAL 0 SQ YD	\$15.00 / SQ YD \$34,005 \$0.00 / SQ YD \$0
Note: * Denotes User Supplied Quantity RIGID CONSTRUCTION ANNUL	TION INITIAL COST \$253,553 AL COST PER MILE \$107,062
MAINTENANCE COSTS:	
ITEM THICKNESS MATERIAL T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY	\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY (2.50") 2.50 HMA POLICY OVERLAY PVMT (2.50") 1.0104 2.50	
HMA SURFACE MIX (1.50") 1.0063 Surface Mix 1.50	\$9.16 / SQ YD
HMA BINDER MIX (1.00") 1.0167 aling Binder Mix 1.00 HMA POLICY OVERLAY SHLD (2.50") Shoulder Mix 2.50	
CLASS A PAVEMENT PATCHING	\$195.00 / SQ YD
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING	\$150.00 / SQ YD \$145.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) Surface Mix 1.50 PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50") Surface Mix 2.50	\$79.10 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL	\$2.00 /LIN FT
CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL	\$2.00 / LIN FT \$2.00 / LIN FT
RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / Station / Lane)	\$2.00 / LIN FT

INITIAL COST	PRESENT WORTH	JPCP \$253,553	HMA \$210,754	
	ANNUAL COST PER WILE	\$107,062	\$88,990	
CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$36,504 \$15,414	\$59,318 \$25,047	
CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$290,057 \$122,476	\$270,072 \$114,037	
OST ANALYSIS: FIN	IAL SUMMARY			
	·>	НМА	\$114,037	
ΓΟ HIGHEST):	TYPE / PERCENTAGE	JPCP	\$122,476	7.4%
	OST ANALYSIS: FIN	PRESENT WORTH ANNUAL COST PER MILE DST ANALYSIS: FINAL SUMMARY	PRESENT WORTH \$290,057 ANNUAL COST PER MILE \$122,476 DST ANALYSIS: FINAL SUMMARY	PRESENT WORTH \$290,057 \$270,072 \$114,037 DST ANALYSIS: FINAL SUMMARY

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

		STA	NDARD DES	SIGN				
MAINTENANCE COSTS:	ITEM		%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5								
12711	LONG SHLD JT R&S		100.00%	2.040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.10%	2	SQ YD	\$82.14	\$164	
		PWFn =	0.8626		PW =	0.8626	X \$5,366	\$4,629
YEAR 10								
	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.50%	11	SQ YD	\$82.14	\$904	
		PWFn =	0.7441		PW =	0.7441	X \$6,106	\$4,543
YEAR 1	5							
	MILL PVMT & SHLD 2.00"		100.00%		SQ YD	\$3.00	\$6,801	
	PD PVMT PATCH M&F ADD'L	_ 2.00"	1.00%		SQ YD	\$81.87	\$1,883	
	HMA OVERLAY PVMT 2.00"		100.00%		SQ YD	\$12.24	\$27,746	
	HMA OVERLAY SHLD 2.00 "		100.00%	0	SQ YD	\$8.06	\$0	
		PWFn =	0.6419		PW =	0.6419	X \$36,430	\$23,383
YEAR 20								
	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.10%	2	SQ YD	\$82.14	\$164	
		PWFn =	0.5537		PW =	0.5537	X \$5,366	\$2,971
YEAR 25	5							
12/01/20	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.50%	11	SQ YD	\$82.14	\$904	
	LIMA CD	PWFn =	0.4776		PW =	0.4776	X \$6,106	\$2,916
YEAR 30	HMA_SD NON-INTERSTATE							
12/11/ 0/	MILL PVMT & SHLD 2.00"		100.00%	2.267	SQ YD	\$3.00	\$6,801	
	PD PVMT PATCH M&F ADD'L	_ 2.00"	2.00%	,	SQ YD	\$81.87	\$3,684	
	PD SHLD PATCH M&F ADD'L		1.00%		SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25 "	2.00	100.00%		SQ YD	\$13.68	\$31,015	
	HMA OVERLAY SHLD 2.25 "		100.00%		SQ YD	\$9.07	\$0	
		PWFn =	0.4120		PW =	•		\$17,097
YEAR 3								
ILAR 3	LONG SHLD JT R&S		100.00%	2.040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.10%		SQ YD	\$82.14	\$164	
		PWFn =	0.3554		PW =	0.3554	X \$5,366	\$1,907
YEAR 40								
12,00	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.50%	11	SQ YD	\$82.14	\$904	04.070
		PWFn =	0.3066		PW =	0.3066	X \$6,106	\$1,872
							_	\$59,318
	ROUTINE MAINTENANCE ACT	TIVITY		0.10	Lane Miles	0.00	\$0	\$0
	NOOTHYL WANTE LYANGE AC	11 V 11 1		0.19			E-CYCLE COST	\$59,318
49	YEAR LIFE CYCLE	CRFn = 0.040	7852				COST PER MILE	\$25,047

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENANCE COSTS:	ITEM	0/	QUANTITY	LINIT	UNIT COST	COST	PRESENT WORTH
MAINTENANCE COSTS.	I I LIVI	/0	QUANTITI	UNIT	UNIT COST	0031	WORTH
YEAR 10							
TEAR 10	PAVEMENT PATCH CLASS B	0.10%	2	SQ YD	\$150.00	\$300	
	PWFn =	0.7441		PW =	0.7441		\$223
	1 ***111 =	0.7441		1 VV —	0.7441	Λ ψ500	ΨΖΖΟ
YEAR 15							
12/11/10	PAVEMENT PATCH CLASS B	0.20%	5	SQ YD	\$150.00	\$750	
	PWFn =	0.6419		PW =	0.6419		\$481
						****	*
YEAR 20							
<u></u>	PAVEMENT PATCH CLASS B	2.00%	45	SQ YD	\$150.00	\$6,750	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CENTERLINE JT R&S	100.00%	0	LIN FT	\$2.00	\$0	
	PWFn =	0.5537		PW =	0.5537	X \$10,830	\$5,996
YEAR 25		0.000/		00.1/0	* 450.00	* 40.000	
	PAVEMENT PATCH CLASS B	3.00%		SQ YD	\$150.00	\$10,200	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$145.00	\$0 Y \$10,200	£4.070
	PWFn =	0.4776		PW =	0.4776	X \$10,200	\$4,872
YEAR 30	NON-INTERSTATE						
12/11/ 00	PAVEMENT PATCH CLASS B	4.00%	91	SQ YD	\$150.00	\$13,650	
	SHOULDER PATCH CLASS C	1.50%		SQ YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%		SQ YD	\$15.20	\$34,446	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	,	SQ YD	\$10.08	\$0	
	PWFn =	0.4120		PW =	0.4120		\$19,815
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CENTERLINE JT R&S	100.00%	0	LIN FT	\$2.00	\$0	
	RANDOM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,020	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%		LIN FT	\$2.00	\$1,088	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	2	SQ YD	\$85.17	\$170	
	PWFn =	0.3554		PW =	0.3554	X \$6,358	\$2,260
YEAR 40	NON-INTERSTATE						
TEAR 40	PAVEMENT PATCH CLASS B	0.50%	11	SQ YD	\$150.00	\$1,650	
	LONGITUDINAL SHLD JT R&S	100.00%		LIN FT	\$130.00	\$4,080	
	CENTERLINE JT R&S	100.00%	,	LIN FT	\$2.00	\$0	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%		LIN FT	\$2.00	\$1,632	
	RANDOM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,020	
	PD PVMT PATCH M&F HMA 2.50"	0.50%		SQ YD	\$85.17	\$937	
	PWFn =	0.3066		PW =	0.3066		\$2,857
						_	\$36,504
	ROUTINE MAINTENANCE ACTIVITY		0.19	Lane Miles	\$0.00	\$0	\$0
			0.10			IFE-CYCLE COST	\$36.504
45	YEAR LIFE CYCLE CRFn = 0.040	7852				COST PER MILE	\$15,414

Design Period (DP) =

20

years

Printed: 10/24/2017

45%

45%

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells) Route: Wolf Road Comments: IL 58 @ Wolf Rd (Roundabout) Section: 583-R County: Cook Design Date: 02/10/2017 <-- BY <-- BY ADT Location: at Wolf Road (Roundabout) Modify Date: Year Current: 2015 Facility Type Unmarked State Route Future: 23,000 2040 # of Lanes = Structural Design Traffic Minimum Actual Actual %of % of ADT in Road Class: ADT ADT Total ADT Design Lane PV = No Min 16,905 95.4% Subgrade Support Rating (SSR): SU = S= No Min 638 3.6% Construction Year: 2018 MU = No Min 177 1.0% M =

TRAFFIC FACTOR CALCULATION

Struct. Design ADT =

17,720

(2028)

FLEXIBLE PAVEMENT RIGID PAVEMENT

Cpv = 0.15 Cpv = 0.15 Csu = 132.5 Csu = 143.81 Cmu = 482.53 Cmu = 696.42

TF flexible (Actual) = 1.55 (Actual ADT) TF rigid (Actual) = 1.95 (Actual ADT)

TF flexible (Min) = No Min (Min ADT Fig. 54-2.C) TF rigid (Min) = No Min (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS									
	Full-Depth HMA Pavement				JPC Pavement				
	Use TF flexible =	1.55		Use TF rigid =	1.95				
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.			
Goto Map	HMA Mixture Temp. =	74.0	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	8.25	in. (Fig. 54-4.E)			
	Design HMA Mixture Modulus (E _{HMA}) =	720	ksi (Fig. 54-5.D)						
	Design HMA Strain (ϵ_{HMA}) =	106	(Fig. 54-5.E)	(CRC Pave	ement			
	Full Depth HMA Design Thickness =	8.75	in. (Fig. 54-5.F)	Use TF rigid =	1.95				
Goto Map	Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)	IBR value =	3				
	Use Full-Depth HMA Thickness =	8.75	inches	CRCP Thickness =	7.00	in. (Fig. 54-4.M)			

TF MUST BE > 60 FOR CRCP

	RECONSTRUCTION ON	ILY (SUF	PPLEMENTAL) PAVEMI	ENT DESIGN CALCULATIONS
	HMA Over	lay of Rubl	blized PCC	Unbonded Concrete Overlay
	Use TF flexible =	1.55		Review 54-4.03 for limitations and
Cata Man	HMA Overlay Design Thickness =	6.00	in. (Fig. 54-5.U)	special considerations.
Goto Map	Limiting Strain Criterion Thickness =		in. (Fig. 54-5.V)	7
	Use HMA Overlay Thickness =	999.00	inches	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

1	Class I Roads	Class II Roads	Class III Roads	Class IV Roads
	4 lanes or more	2 lanes with ADT > 2000	2 Lanes	2 Lanes
	Part of a future 4 lanes or more	One way Street with ADT <= 3500	(ADT 750 -2000)	(ADT < 750)

	Min. Str.	Min. Str. Design Traffic (Fig 54-2.C)				
Facility Type	PV	SU	MU			
Interstate or Freeway	0	500	1500			
Other Marked State Route	0	250	750			
Unmarked State Route	No Min	No Min	No Min			

		Traffic Factor ESAL Coefficients					
	Rigid (Fig. 54-4.C)	Flexible (F	ig. 54-5.B)			
Class	Csu	Cmu	Csu	Cmu			
	143.81	696.42	132.50	482.53			
II	135.78	567.21	112.06	385.44			
III	129.58	562.47	109.14	384.35			
IV	129.58	562.47	109.14	384.35			

Class	Table for		
One-Way Streets			
ADT	Class		
0 - 3500	II		
>3501			

Class 7	Table for				
2 or 3 lanes					
(not future 4 lane &					
not one-v	way street)				
ADT	Class				
0 - 749	IV				
750 - 2000	III				
>2000	II .				

	Design L	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
		Rural	Urban				
Number of Lanes	Р	S	М	Р	S	M	
1 Lane Ramp	100%	100%	100%	100%	100%	100%	
2 or 3	50%	50%	50%	50%	50%	50%	
4	32%	45%	45%	32%	45%	45%	
6 or more	20%	40%	40%	8%	37%	37%	

BDE 5401 Template (Rev. 09/05/2013) Printed: 10/24/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA P	PAVEMENT				S	tandard Design
ROUTE SECTION COUNTY LOCATION	at	Wolf Roa 583-I Coo Wolf Road (Roundabou	R k			
FACILITY TYPE		NON-INTERSTAT	E			
H	HMA Inside HMA Outside Total Width of Paved Shou	1	0 FT ==> 0 CL 4 LANES 4 EP 0 FT 0 FT 0 FT 0 FT	0.06	Miles	
PAVEMENT THICKNESS (F	FLEXIBLE)		5 IN		IN MAX	
SHOULDER THICKNESS POLICY OVERLAY THICKNE	ESS		0 IN 5 IN	HMA_SD	Standard Design	
FLEX PAVEMENT TRAFF	IC FACTORS	MINIMUN No Min	М	ACTUAL 1.55	USE 1.55	
		NO WIII		1.55		
HMA COST PER TON				UNIT PRICE	Read Me!	1
HMA SURFACE				\$100.70	/ TON	
HMA TOP BINDER				\$99.24		
HMA LOWER BINDER HMA BINDER (LEVELING)				\$89.50 \$99.24		
HMA SHOULDER				\$72.00		
INITIAL COSTS						
ITEM	TUICIAIECO		V LINIIT		0007	
I I LIVI	THICKNESS	100% QUANTIT	Y UNII	UNIT PRICE	COST	
TTLIVI	THICKNESS	100% QUANTII	Y UNII	UNIT PRICE	COST	
HMA PAVEMENT (FULL-D			2 SQ YD *	UNIT PRICE \$46.89		
0		1422 1,422			/SQ YD \$66,688 ~]
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE	(8.75°) (8.75°) (2.00°) (5 (2.25°)	1422 1,422 1.0083 16 1 1.0260 18 4	2 SQ YD * I TONS I TONS	\$46.89 \$100.70 \$99.24	/SQ YD \$66,688 ~ /TON \$0 /TON \$0	
HMA PAVEMENT (FULL-D	(8.75°) (8.75°) (2.00°) (5 (2.25°)	1422 1,422 1.0083 16 1 1.0260 18 4	2 SQ YD *	\$46.89 \$100.70	/SQ YD \$66,688 ~ /TON \$0 /TON \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE	(8.75°) (8.75°) (2.00°) (5 (2.25°)	1422 1,422 1.0083 16 1 1.0260 18 4	2 SQ YD * I TONS I TONS	\$46.89 \$100.70 \$99.24	/SQ YD \$66,688 ~ /TON \$0 /TON \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUR	(8.75°) (8.75°) (2.00°) (5 (2.25°)	1422 1,422 1.0083 161 1.0260 184 1.0542 378	2 SQ YD * 1 TONS 4 TONS 3 TONS	\$46.89 \$100.70 \$99.24 \$89.50	/SQYD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUR	(2.00") (2.00") (2.25") (4.50")	1422 1,422 1.0083 161 1.0260 184 1.0542 378	2 SQ YD * I TONS I TONS TONS TONS	\$46.89 \$100.70 \$99.24 \$89.50	/SQYD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUR	(2.00") (2.00") (2.25") (4.50") (8.00")	1422 1,422 1.0083 161 1.0260 184 1.0542 378	2 SQ YD * 1 TONS 4 TONS 3 TONS	\$46.89 \$100.70 \$99.24 \$89.50	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 ~ /LIN FT \$38,400	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUR HMA SHOULDER CURB & GUTTER	(2.00") (2.00") (2.25") (4.50") (8.00")	1422 1,422 1.0083 161 1.0260 184 1.0542 378 0 (1,280	2 SQ YD * 1 TONS 14 TONS 3 TONS 2 TONS 5 TONS 5 TONS 5 TONS 6 TONS 7 TON	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 ~ /LIN FT \$38,400	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE:	(2.00") (2.00") (2.00") (2.05") (8.00") (8.00")	1422 1,422 1.0083 161 1.0260 188 1.0542 378 0 0 1,280 Width = 44.9' 1,597	2 SQ YD * 1 TONS 4 TONS 3 TONS O TONS O LIN FT * 2 TONS 7 SQ YD	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 ~ /LIN FT \$38,400 /TON \$50 /SQ YD \$11,179	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY ((8.75") (2.00") (2.00") (2.25") (8.00") (8.00") C (TONS) Aggregate	1422 1,422 1.0083 161 1.0260 184 1.0542 378 0 0 1,280 Width = 44.9' 1,597	2 SQ YD * 1 TONS 4 TONS 3 TONS O TONS O LIN FT * 2 TONS	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 ~ /LIN FT \$38,400 /TON \$50	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier	(8.75") (2.00") (2.00") (2.25") (8.00") (8.00") C (TONS) Aggregate	1422 1,422 1,0083 161 1,0260 184 1,0542 378 0 (1,280 Width = 44.9' 1,597	2 SQYD * 1 TONS 14 TONS 15 TONS 16 TONS 16 TONS 17 TON	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$50 /LIN FT \$38,400 /TON \$50 /SQ YD \$11,179 /UNITS \$0 /UNITS \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUR HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplied PAVEMENT REMOVAL	(8.75") (2.00") (2.00") (2.25") (8.00") (8.00") C (TONS) Aggregate	1422 1,422 1.0083 161 1.0260 184 1.0542 378 0 (1,280 Width = 44.9' 1,597	2 SQ YD * 1 TONS 4 TONS 3 TONS O TONS O TONS O TONS O TONS O TONS O UNITS O UNITS O UNITS O UNITS O UNITS	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$0.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$50 /LIN FT \$38,400 /TON \$50 /SQ YD \$11,179 /UNITS \$0 /UNITS \$0 /SQ YD \$21,330	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier	(8.75") (2.00") (2.00") (2.25") (8.00") (8.00") C (TONS) Aggregate	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,286) Width = 44.9' 1,597	2 SQ YD * 1 TONS 4 TONS 3 TONS 0 TONS 0 LIN FT * 2 TONS 7 SQ YD 0 UNITS 0 UNITS 0 UNITS 2 SQ YD 0 SQ YD	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$50 /LIN FT \$38,400 /TON \$50 /SQ YD \$11,179 /UNITS \$0 /UNITS \$0 /SQ YD \$21,330 /SQ YD \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUR HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplied PAVEMENT REMOVAL	(2.00") (2.00") (2.25") RSE	1422 1,422 1.0083 161 1.0260 184 1.0542 378 0 (1,280 Width = 44.9' 1,597 (1,422 (FLEXIBLE COI	2 SQ YD * 1 TONS 1 TONS 2 TONS 3 TONS 2 TONS 2 TONS 2 TONS 2 TONS 3 UNITS 4 UNITS 4 UNITS 5 UNITS 6 SQ YD 7 SQ YD 8 SQ	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 ~ / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COURSE HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY O IMPROVED SUBGRADE: Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL	(2.00") (2.00") (2.25") RSE	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,286) Width = 44.9' 1,597	2 SQ YD * 1 TONS 1 TONS 2 TONS 3 TONS 2 TONS 2 TONS 2 TONS 2 TONS 3 UNITS 4 UNITS 4 UNITS 5 UNITS 6 SQ YD 7 SQ YD 8 SQ	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00	/SQ YD \$66,688 ~ /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$0 /TON \$50 /LIN FT \$38,400 /TON \$50 /SQ YD \$11,179 /UNITS \$0 /UNITS \$0 /SQ YD \$21,330 /SQ YD \$0	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COURSE HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY O IMPROVED SUBGRADE: Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL	(2.00") (2.00") (2.25") RSE	1422 1,422 1.0083 161 1.0260 184 1.0542 378 0 (1,280 Width = 44.9' 1,597 (1,422 (FLEXIBLE COI	2 SQ YD * 1 TONS 1 TONS 2 TONS 3 TONS 2 TONS 2 TONS 2 TONS 2 TONS 3 UNITS 4 UNITS 4 UNITS 5 UNITS 6 SQ YD 7 SQ YD 8 SQ	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 ~ / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier	(2.00") (2.00") (2.25") RSE	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,280 Width = 44.9' 1,597 (1,422 (1,422) FLEXIBLE CONSTRUCTIO	2 SQ YD * 1 TONS 4 TONS 3 TONS O TONS O LIN FT * 2 TONS 7 SQ YD O UNITS UNITS 2 SQ YD NSTRUCTIO N ANNUAL (\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 ~ / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier MAINTENANCE COSTS:	(2.00") (2.00") (2.25") RSE (4.50") (8.00") C (TONS) Aggregate d Item d Item THICKNESS	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,280 Width = 44.9' 1,597 (1,422 (1,422) FLEXIBLE CONSTRUCTIO	2 SQ YD * 1 TONS 4 TONS 3 TONS O TONS O LIN FT * 2 TONS 7 SQ YD O UNITS UNITS 2 SQ YD NSTRUCTIO N ANNUAL (\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00 N INITIAL COST COST PER MILE UNIT COST	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 ~ / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COURSE HMA LOWER BINDER COURSE HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY O IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier MAINTENANCE COSTS: ITEM ROUTINE MAINTENANCE A HMA OVERLAY PVMT SUR	(2.00") (2.00") (2.25") (8.00") (8.00") (8.00") C (TONS) Aggregate d Item d Item THICKNESS CTIVITY F (2.00")	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,280 Width = 44.9' 1,597 (1,422 (1,422) FLEXIBLE CONSTRUCTIO	2 SQ YD * 1 TONS 4 TONS 3 TONS O TONS O LIN FT * 2 TONS 7 SQ YD O UNITS O UNI	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00 N INITIAL COST COST PER MILE UNIT COST	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647 \$92,630	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COURSE HMA LOWER BINDER COURSE HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY O IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier MAINTENANCE COSTS: ITEM ROUTINE MAINTENANCE A HMA OVERLAY PVMT SUR HMA OVERLAY PVMT	(2.00") (2.00") (2.25") (8.00") (8.00") (1.00) (1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,280 Width = 44.9' 1,597 (1,422 (1,422) (1,	2 SQ YD * 1 TONS 14 TONS 3 TONS 2 TONS 2 TONS 7 SQ YD 2 TONS 2 SQ YD 2 SQ YD 3 SQ YD 4 SQ YD 5	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00 N INITIAL COST COST PER MILE UNIT COST \$0.00 \$11.37	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 ~ / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647 \$92,630 LANE-MILE / YEAR / SQ YD / SQ YD	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier MAINTENANCE COSTS: ITEM ROUTINE MAINTENANCE A HMA OVERLAY PVMT SUR HMA OVERLAY PVMT HMA SURFACE MIX	(2.00") (2.00") (2.25") RSE (4.50") (8.00") C (TONS) Aggregate d Item d Item THICKNESS CTIVITY F (2.00") (2.25") (1.50")	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,280 Width = 44.9' 1,597 (1,422 (1,422) (1,	2 SQ YD * 1 TONS 14 TONS 15 TONS 15 TONS 16 TO	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00 N INITIAL COST COST PER MILE UNIT COST \$0.00 \$11.37 \$12.74 \$8.51	/ SQ YD \$66,688 ~ / TON \$0 / TON \$50 / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647 \$92,630 LANE-MILE / YEAR / SQ YD	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier MAINTENANCE COSTS: ITEM ROUTINE MAINTENANCE A HMA OVERLAY PVMT SUR HMA OVERLAY PVMT HMA SURFACE MIX HMA BINDER MIX	(2.00") (2.00") (2.25") RSE (4.50") (8.00") C (TONS) Aggregate d Item d Item THICKNESS CTIVITY F (2.00") (2.25") (1.50") (0.75")	1422 1,422 1.0083 161 1.0260 184 1.0542 378 0 (1,280 1,280 Width = 44.9' 1,597 (1,422) (1,597) (2,422) (1,422)	2 SQ YD * 1 TONS 1 TONS 2 TONS 2 TONS 2 TONS 2 TONS 3 TONS 4 TONS 4 TONS 5 UNITS 6 UNITS 6 UNITS 7 SQ YD 8 SQ YD 8 SQ YD 8 STRUCTIO 8 ANNUAL (C) 8 TONS 8 SQ YD 8 SQ Y	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00 N INITIAL COST COST PER MILE UNIT COST \$0.00 \$11.37 \$12.74 \$8.51 \$4.23	/ SQ YD \$66,688 ~ / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$0 / TON \$50 / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647 \$92,630 LANE-MILE / YEAR / SQ YD	
HMA PAVEMENT (FULL-D HMA SURFACE COURSE HMA TOP BINDER COURSE HMA LOWER BINDER COUF HMA SHOULDER CURB & GUTTER SUBBASE GRAN MATL TY (IMPROVED SUBGRADE: Reserved For User Supplier Reserved For User Supplier PAVEMENT REMOVAL SHOULDER REMOVAL Note: * Denotes User Supplier MAINTENANCE COSTS: ITEM ROUTINE MAINTENANCE A HMA OVERLAY PVMT SUR HMA OVERLAY PVMT HMA SURFACE MIX	(2.00") (2.00") (2.25") RSE (4.50") (8.00") C (TONS) Aggregate d Item d Item THICKNESS CTIVITY F (2.00") (2.25") (1.50")	1422 1,422 1.0083 161 1.0260 184 1.0542 376 0 (1,280 Width = 44.9' 1,597 (1,422 (1,422) (1,	2 SQ YD * 1 TONS 1 TONS 2 TONS 3 TONS O TONS O LIN FT * 2 TONS 7 SQ YD O UNITS O UNIT	\$46.89 \$100.70 \$99.24 \$89.50 \$72.00 \$30.00 \$25.00 \$7.00 \$0.00 \$15.00 \$0.00 UNIT COST COST PER MILE UNIT COST \$0.00 \$11.37 \$12.74 \$8.51 \$4.23 \$9.07	/ SQ YD \$66,688 ~ / TON \$0 / TON \$50 / LIN FT \$38,400 / TON \$50 / SQ YD \$11,179 / UNITS \$0 / UNITS \$0 / SQ YD \$21,330 / SQ YD \$0 \$137,647 \$92,630 LANE-MILE / YEAR / SQ YD	

Surface Mix 2.00 **\$81.28** / SQ YD

PARTIAL DEPTH PVMT PATCH

(Mill & Fill Surf)

PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	\$78.06 /	SQ YD		
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	\$81.11 /			
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	2.00	\$78.06 /	SQ YD		
LONGITUDINAL SHOULDER JOINT	ROUT & SEAL			\$2.00 /	LIN FT		
CENTERLINE JOINT ROUT & SEAL	='			\$2.00 /			
RANDOM / THERMAL CRACK ROU	T & SEAL	(100% Rehab = 110.00' / Station	/ Lane)	\$2.00 /	LIN FT		
		FLEXIBLE T	OTAL LIF	E-CYCLE COST	\$	175,765	
		FLEXIBLE TOTAL A	ANNUAL (COST PER MILE	\$	118,282	

PCC PAVEMENT					JPCP
ROUTE	Wolf Road	İ			
SECTION	583-R				
COUNTY	Cook				
	f Road (Roundabout))			
EACH ITY TYPE	NON INTERSTATE				
FACILITY TYPE	NON-INTERSTATE	1			
PROJECT LENGTH		FT ==>	0.06	Miles	
# OF CENTERLINES		CL			
# OF LANES		LANES			
# OF EDGES LANE WIDTH - AVERAGE		EP			
SHOULDER WIDTH PCC Inside		FT FT			
PCC Outside		FT			
Total Width of Paved Shoulder		FT			
(- /	JPCP 8.25		TIED SHLD		
SHOULDER THICKNESS	8.25	IN			
POLICY OVERLAY THICKNESS	2.50	IN			
RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	l	ACTUAL		USE
Manhabast Construction Transis	No Min	The De	1.95		1.95
Worksheet Construction Type is Reconstruction		The Pa	vement Type is		JPCP
INITIAL COSTS ITEM THICKNESS	100% QUANTITY	LINIT	UNIT PRICE		COST
JPC PAVEMENT (8.25")		SQ YD		/ SQ YD	\$87,922
PAVEMENT REINFORCEMENT		SQ YD		/ SQ YD	\$0
STABILIZED SUBBASE (4.00")	0	SQ YD *	\$19.00	/ SQ YD	\$0
PCC SHOULDERS		SQ YD		/ SQ YD	\$0
CURB & GUTTER	1,280	LIN FT *	\$30.00	/LIN FT	\$38,400
SUBBASE GRAN MATL TY C (~ 0.00")	0	TONS	\$25.00	/ TON	\$0
IMPROVED SUBGRADE: Aggregate Wid	th = 42.0' 1,493	SQ YD		/ SQ YD	\$10,451
Reserved For User Supplied Item	0	UNITS	\$0.00	/ UNITS	\$0
Reserved For User Supplied Item	0	UNITS	\$0.00	/ UNITS	\$0
PAVEMENT REMOVAL	1 422	SQ YD	\$15.00	/ SQ YD	\$21,330
SHOULDER REMOVAL	,	SQ YD		/ SQ YD	\$0
Note: * Decete Head Overland Overethe	DIOID CON	OTDUOTION	N INITIAL COST		£450.400
Note: * Denotes User Supplied Quantity R	GID CONSTRUCTION				\$158,103 \$106,396
MAINTENANCE COSTS: ITEM THICKNESS	MATERIAL	. т	UNIT COST		
ROUTINE MAINTENANCE ACTIVITY				/ LANE-MIL	E / VEAD
NOOTHE MAINTENANCE ACTIVITY			ψ0.00	/ LAINE-IVIIL	L/ ILAK
HMA POLICY OVERLAY (2.50")		2.50			
	.0104	2.50		/ SQ YD	
,	.0063 Surface Mix .0167 əling Binder Mix	1.50 1.00		/ SQ YD / SQ YD	
HMA POLICY OVERLAY SHLD (2.50")	.0167 eling Binder Mix Shoulder Mix			/ SQ YD	
OLAGO A DAVEMENT DATOLINO			¢405.00		
CLASS A PAVEMENT PATCHING			\$195.00 \$150.00		
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING			\$150.00 \$145.00		
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)	Surface Mix			/ SQ YD	
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")	Surface Mix	2.50	\$84.10	/ SQ YD	
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00	/ LIN FT	
CENTERLINE JOINT ROUT & SEAL				/ LIN FT	
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				/ LIN FT	
RANDOM CRACK ROUT & SEAL (100% Rehalt	= 100.00' / Station / Lane)		\$2.00	/ LIN FT	
	RIGID	TOTAL LIFE	E-CYCLE COST		\$180,770

		_	JPCP	НМА	
CONSTRUCTION	INITIAL COST	PRESENT WORTH ANNUAL COST PER MILE	\$158,103	\$137,647	
		ANNUAL COST PER MILE	\$106,396	\$92,630	
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$22,667	\$38,118	
		ANNUAL COST PER MILE	\$15,254	\$25,652	
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$180,770	\$175,765	
TOTAL	LII E-010LE 0001	ANNUAL COST PER MILE	\$121,650	\$118,282	
LIFE-CYCL	E COST ANALYSIS	S: FINAL SUMMARY			
LIFE-CYCL		S: FINAL SUMMARY	нма	\$118,282	
LOWEST COST OPT		S: FINAL SUMMARY TYPE / PERCENTAGE	HMA JPCP	\$118,282 \$121,650	2.8%

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	SIA	NDARD DESI		LINIT	UNIT COST	COST	PRESENT
WAINTENANCE COSTS.	IIEW		70	QUANTITY	UNIT	UNIT COST	COS1	WORTH
YEAR								
	LONG SHLD JT R&S CNTR LINE JOINT R&S		100.00% 100.00%		LIN FT LIN FT	\$2.00 \$2.00	\$2,560 \$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$1,408	
	PD PVMT PATCH M&F SURF		0.10%		SQ YD	\$81.28	\$81	
		PWFn =	0.8626		PW =	0.8626		\$3,493
YEAR	10							
ILAN	LONG SHLD JT R&S		100.00%	1.280	LIN FT	\$2.00	\$2,560	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$1,408	
	PD PVMT PATCH M&F SURF	DWE	0.50%	7	SQ YD	\$81.28	\$569	#0.07 0
		PWFn =	0.7441		PW =	0.7441	X \$4,537	\$3,376
YEAR	15							
	MILL PVMT & SHLD 2.00"		100.00%		SQ YD	\$3.00	\$4,266	
	PD PVMT PATCH M&F ADD'L	_ 2.00"	1.00%		SQ YD	\$81.11	\$1,136	
	HMA OVERLAY PVMT 2.00" HMA OVERLAY SHLD 2.00 "		100.00% 100.00%		SQ YD SQ YD	\$11.37 \$8.06	\$16,174 \$0	
	TIMA OVEREAT STIED 2.00	PWFn =	0.6419	0	PW =			\$13,849
			0.0 0			0.01.0	χ ψΞι,σισ	ψ.ο,ο.ο
YEAR :								
	LONG SHLD JT R&S		100.00%		LIN FT	\$2.00	\$2,560	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0 \$1.408	
	RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF		50.00% 0.10%		LIN FT SQ YD	\$2.00 \$81.28	\$1,408 \$81	
	I DI VIII I ATCIT III A SORT	PWFn =	0.5537	<u> </u>	PW =	0.5537		\$2,242
								. ,
YEAR :			400.000/	4.000	LINIET	#0.00	#0.500	
	LONG SHLD JT R&S CNTR LINE JOINT R&S		100.00% 100.00%		LIN FT LIN FT	\$2.00 \$2.00	\$2,560 \$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$1,408	
	PD PVMT PATCH M&F SURF		0.50%		SQ YD	\$81.28	\$569	
		PWFn =	0.4776		PW =	0.4776	X \$4,537	\$2,167
VEAD	HMA_SD							
YEAR	MILL PVMT & SHLD 2.00"		100.00%	1 422	SQ YD	\$3.00	\$4,266	
	PD PVMT PATCH M&F ADD'L	2.00"	2.00%		SQ YD	\$81.11	\$2,271	
	PD SHLD PATCH M&F ADD'L	. 2.00"	1.00%		SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25 "		100.00%	1,422	SQ YD	\$12.74	\$18,126	
	HMA OVERLAY SHLD 2.25 "		100.00%	0	SQ YD	\$9.07	\$0	
		PWFn =	0.4120		PW =	0.4120	X \$24,663	\$10,161
YEAR	35							
i Litit	LONG SHLD JT R&S		100.00%	1,280	LIN FT	\$2.00	\$2,560	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$1,408	
	PD PVMT PATCH M&F SURF	PWFn =	0.10%	1	SQ YD	\$81.28	\$81	¢4 420
		PWFN =	0.3554		PW =	0.3554	X \$4,049	\$1,439
YEAR								
	LONG SHLD JT R&S		100.00%		LIN FT	\$2.00	\$2,560	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF		50.00% 0.50%		LIN FT SQ YD	\$2.00 \$81.28	\$1,408 \$569	
	TET VINITATOTI MAI CONT	PWFn =	0.3066	<u> </u>	PW =			\$1,391
							<u>-</u>	
								\$38,118
	ROUTINE MAINTENANCE ACT	ΓΙVΙΤΥ		0.24	Lane Miles	0.00	\$0	\$0
_					MA	INTENANCE L	IFE-CYCLE COST	\$38,118
	YEAR LIFE CYCLE	CRFn = 0.040	7852		MAINTEN	ANCE ANNUA	L COST PER MILE	\$25,652

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

								PRESENT
MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	1	SQ YD	\$150.00		\$150	
	PWFn =	0.7441		PW =	0.7441	Х	\$150	\$112
VEAD 45								
YEAR 15		0.000/		00 VD	0.450.00		0.450	
	PAVEMENT PATCH CLASS B	0.20%	3	SQ YD	\$150.00		\$450	# 000
	PWFn =	0.6419		PW =	0.6419	Х	\$450	\$289
YEAR 20								
TEAR 20	PAVEMENT PATCH CLASS B	2.00%	20	SQ YD	\$150.00		\$4,200	
	SHOULDER PATCH CLASS C	0.50%		SQ YD	\$130.00		\$4,200	
	LONGITUDINAL SHLD JT R&S	100.00%		LIN FT	\$2.00		\$2,560	
	CENTERLINE JT R&S	100.00%		LIN FT	\$2.00		\$2,500	
	PWFn =	0.5537	0	PW =	0.5537	Y	\$6,760	\$3,743
	1 *** 11 =	0.0001		. ** -	0.0001	,,	ψ0,700	ψ5,7 45
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	43	SQ YD	\$150.00		\$6,450	
	SHOULDER PATCH CLASS C	1.00%		SQ YD	\$145.00		\$0	
	PWFn =	0.4776		PW =	0.4776	Х	\$6,450	\$3,081
							, , , , ,	**/**
YEAR 30	NON-INTERSTATE							
<u></u>	PAVEMENT PATCH CLASS B	4.00%	57	SQ YD	\$150.00		\$8,550	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$145.00		\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	1,422	SQ YD	\$14.16		\$20,141	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	\$10.08		\$0	
	PWFn =	0.4120		PW =	0.4120	Χ	\$28,691	\$11,820
YEAR 35								
	LONGITUDINAL SHLD JT R&S	100.00%	,	LIN FT	\$2.00		\$2,560	
	CENTERLINE JT R&S	100.00%		LIN FT	\$2.00		\$0	
	RANDOM CRACK R&S	50.00%		LIN FT	\$2.00		\$1,280	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%		LIN FT	\$2.00		\$672	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	1	SQ YD	\$84.10		\$84	
	PWFn =	0.3554		PW =	0.3554	X	\$4,596	\$1,633
VEAD 10	NON INTEROTATE							
YEAR 40		0.500/	_	00 VD	#450.00		04.050	
	PAVEMENT PATCH CLASS B	0.50%		SQ YD	\$150.00		\$1,050	
	LONGITUDINAL SHLD JT R&S	100.00%		LIN FT	\$2.00		\$2,560	
	CENTERLINE JT R&S	100.00%		LIN FT	\$2.00		\$0	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%		LIN FT	\$2.00		\$1,008	
	RANDOM CRACK R&S PD PVMT PATCH M&F HMA 2.50"	50.00% 0.50%		LIN FT SQ YD	\$2.00 \$84.10		\$1,280 \$589	
	PWFn =	0.3066	/	PW =	0.3066	X	\$6,487	\$1,989
	FWFII=	0.5000		1 VV =	0.5000	^	Ψ0,401	\$22.667
								ΨΖΖ,007
	ROUTINE MAINTENANCE ACTIVITY		0.24	Lane Miles	\$0.00		\$0	\$0
<u> </u>	1 v= 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =				INTENANCE L	—		\$22,667
45	YEAR LIFE CYCLE CRFn = 0.0407	7852		MAINTENA	ANCE ANNUAL	COST	PER MILE	\$15,254

FLEXIBLE PAVEMENT

0.15

112.06

385.44

0.40

No Min

Cpv =

Csu =

Cmu =

TF flexible (Actual) =

TF flexible (Min) =

TRAFFIC FACTOR CALCULATION

	F !! B	41 1114 5		1		
	Full-De	pth HMA Pa	vement	JP	C Pavem	ent
	Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g	Use TF rigid =	0.53	
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.
Goto Map	HMA Mixture Temp. =	74.0	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	7.75	in. (Fig. 54-4.E)
	Design HMA Mixture Modulus (E _{HMA}) =	720	ksi (Fig. 54-5.D)			
	Design HMA Strain (ϵ_{HMA}) =	147	(Fig. 54-5.E)	(CRC Pave	ement
	Full Depth HMA Design Thickness =	7.00	in. (Fig. 54-5.F)	Use TF rigid =	0.53	
Goto Map	Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)	IBR value =	3	
	Use Full-Depth HMA Thickness =	7.00	inches	CRCP Thickness =	5.50	in. (Fig. 54-4.N)

(Actual ADT)

(Min ADT Fig. 54-2.C)

	RECONSTRUCTION ON	LY (SUI	PPLEMENTAL) PAVEM	ENT DESIGN CALCULATIONS
	HMA Over	lay of Rubl	blized PCC	Unbonded Concrete Overlay
	Use TF flexible = 0.50 HMA Overlay Design Thickness = 4.75 in. (Fig. 54-5.U) Review 54-4.03 for limitations and special considerations.			
	HMA Overlay Design Thickness =	4.75	in. (Fig. 54-5.U)	
Goto Map	Limiting Strain Criterion Thickness =		in. (Fig. 54-5.V)	oposiai concideratione.
	Use HMA Overlay Thickness =	999.00	inches	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

TF MUST BE > 60 FOR CRCP

RIGID PAVEMENT

0.15

135.78

567.21

0.53

TF rigid (Min) = No Min (Min ADT Fig. 54-2.C)

(Actual ADT)

Cpv =

Csu =

Cmu =

TF rigid (Actual) =

Class I Roads		Class II Roads		С	lass III Roa	ds	Class IV Roads	
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500		2 lanes with ADT > 2000 One way Street with ADT <= 3500		2 Lanes (ADT 750 -2000)			2 La (ADT <	
	Min. Str.	Design Traffic (Fig	54-2.C)	1		Class T	able for	Ì
Facility Type	PV	SU	MU	1		One-Way		
Interstate or Freeway	0	500	1500	1		ADT	Class	
Other Marked State Route	0	250	750			0 - 3500	П	
Unmarked State Route	No Min	No Min	No Min			>3501		
	_	raffic Factor ESA	Coefficients			Closs T	able for	
		ig. 54-4.C)		ig. 54-5.B)		2 or 3		
Class	Csu	Cmu	Csu	Cmu		(not future		
1	143.81	696.42	132.50	482.53		not one-w		
II	135.78	567.21	112.06	385.44		ADT	Class	
III	129.58	562.47	109.14	384.35		0 - 749	IV	
IV	129.58	562.47	109.14	384.35		750 - 2000	III	
						>2000	II	
								<u> </u>
	Design La	ane Distribution F	actors For Stru	uctural Desigr	n Traffic (Fig	ı. 54-2.B)		
		Rural			Urban			
Number of Lanes	Р	S	М	Р	S	M		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 09/05/2013) Printed: 10/24/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA	PAVEMENT				5	Standard Design
ROUTE SECTION COUNTY LOCATION	a		<mark>3-R</mark> ook			
FACILITY TYPE		NON-INTERSTA	TE			
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	HMA Inside HMA Outside Total Width of Paved Sho		510 FT ==> 0 CL 2 LANES 4 EP 20 FT 0 FT 0 FT	0.10	Miles	
PAVEMENT THICKNESS SHOULDER THICKNESS POLICY OVERLAY THICKN		8	.00 IN .00 IN .25 IN		IN MAX Standard Design	
FLEX PAVEMENT TRAF	FIC FACTORS	MINIM	UM	ACTUAL	USE	
		No Min		0.40	0.40	
					Read Me!	=
HMA COST PER TON HMA SURFACE				UNIT PRICE \$108.39	/ TON	
HMA TOP BINDER				\$106.00		
HMA LOWER BINDER				\$111.85		
HMA BINDER (LEVELING)				\$106.00		
HMA SHOULDER				\$72.00	/ TON	
INITIAL COSTS ITEM	THICKNESS	S 100% QUANT	ITY UNIT	UNIT PRICE	COST	
HMA PAVEMENT (FULL-	DEPTH) (7.00") 2267 2,2	67 SQ YD *	\$43.22	/ SQ YD \$97,965	-
HMA SURFACE COURSE	(2.00") 1.0083 2	56 TONS	\$108.39	/TON \$0	
HMA TOP BINDER COURS	•	,	93 TONS	\$106.00 \$111.95		
HMA LOWER BINDER COL	JRSE (2.75") 1.0469 3	65 TONS	\$111.85	/ TON \$0	
						<u> </u>
HMA SHOULDER CURB & GUTTER	(8.00"		0 TONS 40 LIN FT *	\$72.00		<u> </u>
CORD & GUITER		2,0	40 LIN FI	\$30.00	/LIN F1 \$61,200	
SUBBASE GRAN MATL TY IMPROVED SUBGRADE:		Width = 44.3' 2,5	0 TONS 12 SQ YD	\$25.00 \$7.00	/ TON \$0 / SQ YD \$17,584	
Reserved For User Supplier Reserved For User Supplier			0 UNITS 0 UNITS		/ UNITS \$0 / UNITS \$0	
PAVEMENT REMOVAL SHOULDER REMOVAL		2,2	67 SQ YD 0 SQ YD	\$15.00 \$0.00	/ SQ YD \$34,005 / SQ YD \$0	
Note: * Denotes User Supp		FLEXIBLE C		N INITIAL COST COST PER MILE	\$210,754 \$88,990	
MAINTENANCE COSTS:						
ITEM	THICKNESS	S MATER	IAL T	UNIT COST		
ROUTINE MAINTENANCE	ACTIVITY				LANE-MILE / YEAR	
HMA OVERLAY PVMT SU				\$12.24		
HMA OVERLAY PVMT HMA SURFACE MIX	(2.25" (1.50"		2.25 Mix 1.50	\$13.68 \$9.16	/ SQ YD / SQ YD	
HMA BINDER MIX	(0.75"				/ SQ YD	
HMA OVERLAY SHLD	(Year 30) (2.25") Shoulder	Mix 2.25	\$9.07	/ SQ YD	
HMA OVERLAY SHLD MILLING (2.00 IN)	(2.00") Shoulder	Mix 2.00 2.00		/ SQ YD	
DADTIAL DESTIL DIGITAL	ATOLI		2.00	400.00	400.40	

Surface Mix 2.00

\$82.14 / SQ YD

PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)

PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	\$78.06	/ SQ YD		
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ") (Mill & Fill +2.00 ")	Leveling Binder Mix Shoulder Mix	2.00	\$81.87 \$78.06			
LONGITUDINAL SHOULDER JOINT CENTERLINE JOINT ROUT & SEAL RANDOM / THERMAL CRACK ROU		00% Rehab = 110.00' / Station	/ Lane)	\$2.00 \$2.00 \$2.00	/ LIN FT		
		FLEXIBLE TO		E-CYCLE COST OST PER MILE		\$270,072 \$114,037	

PCC PAVEMENT	JPCP
ROUTE Broadway Street SECTION 583-R COUNTY Cook LOCATION at Wolf Road (Roundabout)	
FACILITY TYPE NON-INTERSTATE	
PROJECT LENGTH 510 FT = # OF CENTERLINES 0 CL # OF LANES 2 LANES # OF EDGES 4 EP LANE WIDTH - AVERAGE 20 FT SHOULDER WIDTH PCC Inside PCC Outside Total Width of Paved Shoulders 0 FT	
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS JPCP 7.75 IN 7.75 IN	TIED SHLD
POLICY OVERLAY THICKNESS 2.50 IN	
RIGID PAVEMENT TRAFFIC FACTORS MINIMUM	ACTUAL USE
Worksheet Construction Type is Reconstruction The	0.53 0.53 e Pavement Type is JPCP
INITIAL COSTS ITEM THICKNESS 100% QUANTITY UNIT	UNIT PRICE COST
JPC PAVEMENT (7.75") 2,267 SQ YD	\$62.50 / SQ YD \$141,688
PAVEMENT REINFORCEMENT STABILIZED SUBBASE (4.00") 0 SQ YD	\$22.00 / SQ YD \$0 * \$19.00 / SQ YD \$0
PCC SHOULDERS 0 SQ YD CURB & GUTTER 2,040 LIN FT	\$40.00 /SQYD \$0 \$30.00 /LIN FT \$61,200
SUBBASE GRAN MATL TY C (~0.00") 0 TONS IMPROVED SUBGRADE: Aggregate Width = 42.0' 2,380 SQ YD	\$25.00 / TON \$0 \$7.00 / SQ YD \$16,660
Reserved For User Supplied Item 0 UNITS Reserved For User Supplied Item 0 UNITS	\$0.00 / UNITS \$0 \$0.00 / UNITS \$0
PAVEMENT REMOVAL 2,267 SQ YD SHOULDER REMOVAL 0 SQ YD	\$15.00 / SQ YD \$34,005 \$0.00 / SQ YD \$0
Note: * Denotes User Supplied Quantity RIGID CONSTRUCTION ANNUL	TION INITIAL COST \$253,553 AL COST PER MILE \$107,062
MAINTENANCE COSTS:	
ITEM THICKNESS MATERIAL T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY	\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY (2.50") 2.50 HMA POLICY OVERLAY PVMT (2.50") 1.0104 2.50	
HMA SURFACE MIX (1.50") 1.0063 Surface Mix 1.50	\$9.16 / SQ YD
HMA BINDER MIX (1.00") 1.0167 aling Binder Mix 1.00 HMA POLICY OVERLAY SHLD (2.50") Shoulder Mix 2.50	
CLASS A PAVEMENT PATCHING	\$195.00 / SQ YD
CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING	\$150.00 / SQ YD \$145.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf) Surface Mix 1.50 PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50") Surface Mix 2.50	\$79.10 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL	\$2.00 /LIN FT
CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK ROUT & SEAL	\$2.00 / LIN FT \$2.00 / LIN FT
RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / Station / Lane)	\$2.00 / LIN FT

INITIAL COST	PRESENT WORTH	JPCP \$253,553	HMA \$210,754	
	ANNUAL COST PER WILE	\$107,062	\$88,990	
CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$36,504 \$15,414	\$59,318 \$25,047	
CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$290,057 \$122,476	\$270,072 \$114,037	
OST ANALYSIS: FIN	IAL SUMMARY			
	·>	НМА	\$114,037	
ΓΟ HIGHEST):	TYPE / PERCENTAGE	JPCP	\$122,476	7.4%
	OST ANALYSIS: FIN	PRESENT WORTH ANNUAL COST PER MILE DST ANALYSIS: FINAL SUMMARY	PRESENT WORTH \$290,057 ANNUAL COST PER MILE \$122,476 DST ANALYSIS: FINAL SUMMARY	PRESENT WORTH \$290,057 \$270,072 \$114,037 DST ANALYSIS: FINAL SUMMARY

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

		STA	NDARD DES	SIGN				
MAINTENANCE COSTS:	ITEM		%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5								
12711	LONG SHLD JT R&S		100.00%	2.040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.10%	2	SQ YD	\$82.14	\$164	
		PWFn =	0.8626		PW =	0.8626	X \$5,366	\$4,629
YEAR 10								
	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.50%	11	SQ YD	\$82.14	\$904	
		PWFn =	0.7441		PW =	0.7441	X \$6,106	\$4,543
YEAR 1	5							
	MILL PVMT & SHLD 2.00"		100.00%		SQ YD	\$3.00	\$6,801	
	PD PVMT PATCH M&F ADD'L	_ 2.00"	1.00%		SQ YD	\$81.87	\$1,883	
	HMA OVERLAY PVMT 2.00"		100.00%		SQ YD	\$12.24	\$27,746	
	HMA OVERLAY SHLD 2.00 "		100.00%	0	SQ YD	\$8.06	\$0	
		PWFn =	0.6419		PW =	0.6419	X \$36,430	\$23,383
YEAR 20								
	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.10%	2	SQ YD	\$82.14	\$164	
		PWFn =	0.5537		PW =	0.5537	X \$5,366	\$2,971
YEAR 25	5							
12/01/20	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.50%	11	SQ YD	\$82.14	\$904	
	LIMA CD	PWFn =	0.4776		PW =	0.4776	X \$6,106	\$2,916
YEAR 30	HMA_SD NON-INTERSTATE							
12/11/ 0/	MILL PVMT & SHLD 2.00"		100.00%	2.267	SQ YD	\$3.00	\$6,801	
	PD PVMT PATCH M&F ADD'L	_ 2.00"	2.00%	,	SQ YD	\$81.87	\$3,684	
	PD SHLD PATCH M&F ADD'L		1.00%		SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25 "	2.00	100.00%		SQ YD	\$13.68	\$31,015	
	HMA OVERLAY SHLD 2.25 "		100.00%		SQ YD	\$9.07	\$0	
		PWFn =	0.4120		PW =	•		\$17,097
YEAR 3								
ILAR 3	LONG SHLD JT R&S		100.00%	2.040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.10%		SQ YD	\$82.14	\$164	
		PWFn =	0.3554		PW =	0.3554	X \$5,366	\$1,907
YEAR 40								
12,00	LONG SHLD JT R&S		100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CNTR LINE JOINT R&S		100.00%	0	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	561	LIN FT	\$2.00	\$1,122	
	PD PVMT PATCH M&F SURF		0.50%	11	SQ YD	\$82.14	\$904	04.070
		PWFn =	0.3066		PW =	0.3066	X \$6,106	\$1,872
							_	\$59,318
	ROUTINE MAINTENANCE ACT	TIVITY		0.10	Lane Miles	0.00	\$0	\$0
	NOOTHYL WANTE LYANGE AC	11 V 11 1		0.19			E-CYCLE COST	\$59,318
49	YEAR LIFE CYCLE	CRFn = 0.040	7852				COST PER MILE	\$25,047

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

MAINTENANCE COSTS:	ITEM	0/	QUANTITY	LINIT	UNIT COST	COST	PRESENT WORTH
MAINTENANCE COSTS.	I I LIVI	/0	QUANTITI	UNIT	UNIT COST	0031	WORTH
YEAR 10							
TEAR 10	PAVEMENT PATCH CLASS B	0.10%	2	SQ YD	\$150.00	\$300	
	PWFn =	0.7441		PW =	0.7441		\$223
	1 ***111 =	0.7441		1 VV —	0.7441	Λ ψ500	ΨΖΖΟ
YEAR 15							
12/11/10	PAVEMENT PATCH CLASS B	0.20%	5	SQ YD	\$150.00	\$750	
	PWFn =	0.6419		PW =	0.6419		\$481
						****	*
YEAR 20							
<u></u>	PAVEMENT PATCH CLASS B	2.00%	45	SQ YD	\$150.00	\$6,750	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CENTERLINE JT R&S	100.00%	0	LIN FT	\$2.00	\$0	
	PWFn =	0.5537		PW =	0.5537	X \$10,830	\$5,996
YEAR 25		0.000/		00.1/0	* 450.00	* 40.000	
	PAVEMENT PATCH CLASS B	3.00%		SQ YD	\$150.00	\$10,200	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$145.00	\$0 Y \$10,200	£4.070
	PWFn =	0.4776		PW =	0.4776	X \$10,200	\$4,872
YEAR 30	NON-INTERSTATE						
12/11/ 00	PAVEMENT PATCH CLASS B	4.00%	91	SQ YD	\$150.00	\$13,650	
	SHOULDER PATCH CLASS C	1.50%		SQ YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%		SQ YD	\$15.20	\$34,446	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	,	SQ YD	\$10.08	\$0	
	PWFn =	0.4120		PW =	0.4120		\$19,815
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	2,040	LIN FT	\$2.00	\$4,080	
	CENTERLINE JT R&S	100.00%	0	LIN FT	\$2.00	\$0	
	RANDOM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,020	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%		LIN FT	\$2.00	\$1,088	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	2	SQ YD	\$85.17	\$170	
	PWFn =	0.3554		PW =	0.3554	X \$6,358	\$2,260
YEAR 40	NON-INTERSTATE						
TEAR 40	PAVEMENT PATCH CLASS B	0.50%	11	SQ YD	\$150.00	\$1,650	
	LONGITUDINAL SHLD JT R&S	100.00%		LIN FT	\$130.00	\$4,080	
	CENTERLINE JT R&S	100.00%	,	LIN FT	\$2.00	\$0	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%		LIN FT	\$2.00	\$1,632	
	RANDOM CRACK R&S	50.00%		LIN FT	\$2.00	\$1,020	
	PD PVMT PATCH M&F HMA 2.50"	0.50%		SQ YD	\$85.17	\$937	
	PWFn =	0.3066		PW =	0.3066		\$2,857
						_	\$36,504
	ROUTINE MAINTENANCE ACTIVITY		0.19	Lane Miles	\$0.00	\$0	\$0
			0.10			IFE-CYCLE COST	\$36.504
45	YEAR LIFE CYCLE CRFn = 0.040	7852				COST PER MILE	\$15,414

	NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS										
September Full-Depth HMA Pavement JPC Pavement	ent										
	Use TF flexible =	0.68		Use TF rigid =	0.89						
	PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)	Edge Support =	Tied	Shoulder or C.&G.					
Goto Map	HMA Mixture Temp. =	74.0	deg. F (Fig. 54-5.C)	Rigid Pavt Thick. =	7.75	in. (Fig. 54-4.E)					
	Design HMA Mixture Modulus $(E_{HMA}) =$	720	ksi (Fig. 54-5.D)								
	Design HMA Strain (ϵ_{HMA}) =	134	(Fig. 54-5.E)	(CRC Pave	ment					
	Full Depth HMA Design Thickness =	7.50	in. (Fig. 54-5.F)	Use TF rigid =	0.89						
Goto Map	Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.l)	IBR value =	3						
	Use Full-Depth HMA Thickness =	7.50	inches	CRCP Thickness =	6.00	in. (Fig. 54-4.N)					

(Actual ADT)

(Min ADT Fig. 54-2.C)

Cpv =

Csu =

Cmu =

TF flexible (Actual) =

TF flexible (Min) =

0.15

112.06

385.44

0.68

No Min

Unbonded Concrete Overlay Review 54-4.03 for limitations and

Cpv =

Csu =

Cmu =

TF rigid (Actual) =

TF rigid (Min) =

0.15

135.78

567.21

0.89

No Min

(Actual ADT)

(Min ADT Fig. 54-2.C)

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS **HMA Overlay of Rubblized PCC** Use TF flexible = 0.68 HMA Overlay Design Thickness = 5.00 in. (Fig. 54-5.U) special considerations. Goto Map Limiting Strain Criterion Thickness = in. (Fig. 54-5.V) Use HMA Overlay Thickness = inches JPCP Thickness =

CONTACT BMPR FOR ASSISTANCE

TF MUST BE > 60 FOR CRCP

Class I Roads		Class II Roads		C	lass III Roa	ds	Class IV Roads	
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500		(A	2 Lanes ADT 750 -200	00)	2 Lar (ADT <		
	Min. Str. I	Design Traffic (Fig	54-2.C)	l		Class T	able for	
Facility Type	PV	SU	MÚ			One-Wa	y Streets	
Interstate or Freeway	0	500	1500			ADT	Class	
Other Marked State Route	0	250	750			0 - 3500	II	
Unmarked State Route	No Min	No Min	No Min			>3501	I	
Class I II III IV	Csu 143.81 135.78 129.58 129.58	Cmu 696.42 567.21 562.47 562.47	Csu 132.50 112.06 109.14 109.14	Cmu 482.53 385.44 384.35 384.35		,	e 4 lane & vay street) Class IV III	
IV	129.56	302.47	109.14	304.33		>2000	II	
	Design La	ane Distribution Fa	actors For Stru	uctural Desig	n Traffic (Fig	. 54-2.B)		
		Rural			Urban			
Number of Lanes	Р	S	M	Р	S	M		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

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LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAV	<u>EMENT</u>				5	Standard Design
ROUTE SECTION COUNTY LOCATION	at V	State Street 583-R Cook Volf Road (Roundabout)				
FACILITY TYPE		NON-INTERSTATE				
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH HMA HMA Total		0 2 4 20 0 0	FT ==> CL LANES EP FT FT FT	0.07	Miles	
PAVEMENT THICKNESS (FLEX SHOULDER THICKNESS POLICY OVERLAY THICKNESS	IBLE)	7.50 8.00 2.25	IN		IN MAX Standard Design	
FLEX PAVEMENT TRAFFIC F.	ACTORS	MINIMUM		ACTUAL	USE	
		No Min		0.68	0.68	
					Read Me!	
HMA COST PER TON				UNIT PRICE		
HMA SURFACE HMA TOP BINDER				\$96.91 \$95.75		
HMA LOWER BINDER				\$104.12		
HMA BINDER (LEVELING)				\$95.75		
HMA SHOULDER				\$72.00	/ TON	
INITIAL COSTS ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST	
HMA PAVEMENT (FULL-DEPT	H) (7.50")	1689 1,689	SQ YD *	\$42.60	/ SQ YD \$71,947	-
HMA SURFACE COURSE	(2.00")	1.0083 191	TONS	\$96.91	/TON \$0	
HMA TOP BINDER COURSE	(2.25")		TONS	\$95.75		
HMA LOWER BINDER COURSE	(3.25")	1.0490 322	TONS	\$104.12	/TON \$0	_
						=
HMA SHOULDER	(8.00")		TONS	\$72.00		-
CURB & GUTTER		1,520	LIN FT *	\$30.00	/LIN FT \$45,600	
SUBBASE GRAN MATL TY C (TO IMPROVED SUBGRADE:	,	0 Vidth = 44.5' 1,879	TONS SQ YD	\$25.00 \$7.00	/ TON \$0 / SQ YD \$13,153	
Reserved For User Supplied Itel Reserved For User Supplied Itel			UNITS UNITS		/ UNITS \$0 / UNITS \$0	
PAVEMENT REMOVAL SHOULDER REMOVAL		1,689 0	SQ YD SQ YD	\$15.00 \$0.00	/ SQ YD \$25,335 / SQ YD \$0	
Note: * Denotes User Supplied C		FLEXIBLE CONS			\$156,035 \$88,425	
MAINTENANCE COSTS:	THICKNESS	MATERIAL	Т	UNIT COST		
ROUTINE MAINTENANCE ACTIV	'ITY			\$0.00	LANE-MILE / YEAR	
HMA OVERLAY PVMT SURF	(2.00")	1.0083 Surface Mix	2.00	\$10.94	/ SQ YD	
HMA OVERLAY PVMT	(2.25")	1.0094	2.25	\$12.28	/ SQ YD	
HMA SURFACE MIX	(1.50") (0.75")	1.0063 Surface Mix 1.0156 eling Binder Mix	1.50 0.75		/ SQ YD	
HMA BINDER MIX HMA OVERLAY SHLD (Ye	(0.75") ar 30) (2.25")	1.0156 əling Binder Mix Shoulder Mix	2.25		/ SQ YD	
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	2.00	\$8.06	/ SQ YD	
MILLING (2.00 IN)			2.00	\$3.00	/ SQ YD	

Surface Mix 2.00 **\$80.85** / SQ YD

PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)

PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	\$78.06 / \$	SQ YD	
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ") (Mill & Fill +2.00 ")	Leveling Binder Mix Shoulder Mix	2.00 2.00	\$80.72 / 5 \$78.06 / 5		
LONGITUDINAL SHOULDER JOINT CENTERLINE JOINT ROUT & SEAL RANDOM / THERMAL CRACK ROU		(100% Rehab = 110.00' / Station	/ Lane)	\$2.00 /1 \$2.00 /1 \$2.00 /1	LIN FT	
						

PCC PAVEMENT							JPCP
ROUTE SECTION COUNTY LOCATION	at W	/olf Road (l	State Street 583-R Cook Roundabout)				
FACILITY TYPE		NON-I	NTERSTATE				
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH PCC PCC Total Width	Inside Outside of Paved Should	ers	0 2 4 20 0	FT ==> CL LANES EP FT FT FT	0.07	Miles	
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS		JPCP	7.75 7.75		TIED SHLD		
POLICY OVERLAY THICKNESS			2.50	IN			
RIGID PAVEMENT TRAFFIC FACTO	RS		MINIMUM		ACTUAL		USE
Worksheet Construction Type is	Reconstruction		No Min	The Pa	0.89 evement Type is		0.89 JPCP
INITIAL COSTS ITEM	THICKNESS	1009	% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT PAVEMENT REINFORCEMENT STABILIZED SUBBASE	(7.75") (4.00")			SQ YD SQ YD SQ YD *	\$64.85 \$22.00 \$19.00	/ SQ YD	\$109,532 \$0 \$0
PCC SHOULDERS CURB & GUTTER				SQ YD LIN FT *	\$40.00 \$30.00	/ SQ YD / LIN FT	\$0 \$45,600
SUBBASE GRAN MATL TY C IMPROVED SUBGRADE:	(~ 0.00") Aggregate	/idth = 42.0		TONS SQ YD	\$25.00 \$7.00	/ TON / SQ YD	\$0 \$12,411
Reserved For User Supplied Item Reserved For User Supplied Item				UNITS UNITS		/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL			1,689 0	SQ YD SQ YD	\$15.00 \$0.00	/ SQ YD / SQ YD	\$25,335 \$0
Note: * Denotes User Supplied Quantit	у	RIGID COI			N INITIAL COST COST PER MILE		\$192,878 \$109,304
MAINTENANCE COSTS:							
ITEM	THICKNESS		MATERIAL	Т	UNIT COST		
ROUTINE MAINTENANCE ACTIVITY					\$0.00	/ LANE-MII	_E / YEAR
HMA POLICY OVERLAY HMA POLICY OVERLAY PVMT	(2.50") (2.50")	1.0104		2.50 2.50	\$13.64	/ SQ YD	
HMA SURFACE MIX	(1.50")	1.0063	Surface Mix	1.50		/ SQ YD	
HMA BINDER MIX HMA POLICY OVERLAY SHLD	(1.00") (2.50")	1.0167	əling Binder Mix Shoulder Mix	1.00 2.50		/ SQ YD / SQ YD	
CLASS A PAVEMENT PATCHING	, ,						
CLASS A PAVEMENT PATCHING CLASS B PAVEMENT PATCHING					\$195.00 \$150.00		
CLASS C SHOULDER PATCHING					\$145.00		
PARTIAL DEPTH PVMT PATCH (Mill & PARTIAL DEPTH PVMT PATCH (Mill &			Surface Mix Surface Mix	1.50 2.50	\$78.14 \$83.57		
LONGITUDINAL SHOULDER JOINT RO	OUT & SEAL				\$2.00	/ LIN FT	
CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK R	OUT & SEAL					/ LIN FT / LIN FT	
RANDOM CRACK ROUT & SEAL		hab = 100.00'	/ Station / Lane)			/ LIN FT	

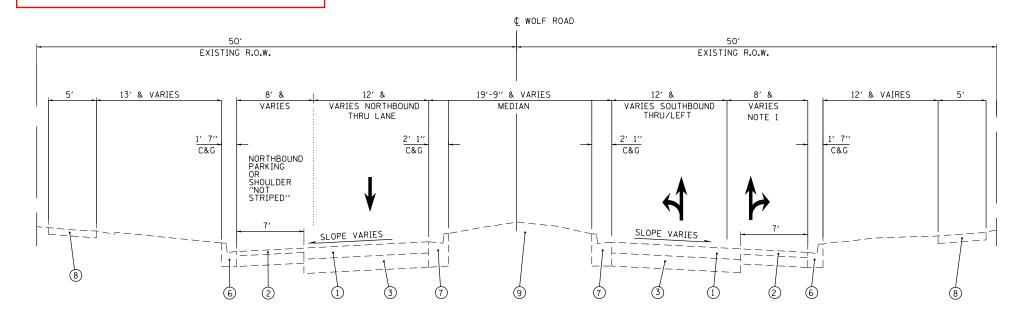
Lii L-OTOL	E COST ANALYSIS:	Calcula Calcula	ated / Revised : 2/	116/17 12:57 PM HMA					
CONSTRUCTION	INITIAL COST	PRESENT WORTH ANNUAL COST PER MILE	\$192,878 \$109,304	\$156,035 \$88,425					
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$26,168 \$14.829	\$41,824 \$23,702					
TOTAL	LIFE-CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$219,046 \$124,133	\$197,859 \$112,127					
LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY									
LOWEST COST OPT	ION =====	>	НМА	\$112,127					

FULL-DEPTH HMA PAVEMENT HMA OVERLAY OF RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	SIA	0/	QUANTITY	LINIT	UNIT COST	COST	PRESENT WORTH
	_		70	QOAINIII	OIVII	01411 0001	0001	WORTH
YEAR 5	LONG SHLD JT R&S		100.000/	4.500	LINIET	#2.00	#2.040	
	CNTR LINE JOINT R&S		100.00% 100.00%		LIN FT LIN FT	\$2.00 \$2.00	\$3,040 \$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$836	
	PD PVMT PATCH M&F SURF		0.10%	2	SQ YD	\$80.85	\$162	
		PWFn =	0.8626		PW =	0.8626	X \$4,038	\$3,483
YEAR 1	0							
	LONG SHLD JT R&S		100.00%	1,520	LIN FT	\$2.00	\$3,040	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF		50.00% 0.50%		LIN FT SQ YD	\$2.00 \$80.85	\$836 \$647	
	FD FVIMI FATCIT MAR SORF	PWFn =	0.7441	0	PW =	0.7441		\$3,366
								*-,
YEAR 1			100.000/	4.000	00 \/D	***	05.007	
	MILL PVMT & SHLD 2.00" PD PVMT PATCH M&F ADD'L	2.00"	100.00%		SQ YD SQ YD	\$3.00 \$80.72	\$5,067 \$1,372	
	HMA OVERLAY PVMT 2.00"	2.00	100.00%		SQ YD	\$10.94	\$18,484	
	HMA OVERLAY SHLD 2.00 "		100.00%		SQ YD	\$8.06	\$0	
		PWFn =	0.6419		PW =	0.6419	X \$24,923	\$15,997
YEAR 2	n l							
TEAR 2	LONG SHLD JT R&S		100.00%	1.520	LIN FT	\$2.00	\$3,040	
	CNTR LINE JOINT R&S		100.00%	,	LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%	418	LIN FT	\$2.00	\$836	
	PD PVMT PATCH M&F SURF	511/5	0.10%	2	SQ YD	\$80.85	\$162	
		PWFn =	0.5537		PW =	0.5537	X \$4,038	\$2,236
YEAR 2	5							
	LONG SHLD JT R&S		100.00%		LIN FT	\$2.00	\$3,040	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF		50.00% 0.50%		LIN FT SQ YD	\$2.00 \$80.85	\$836 \$647	
	121 viii 17(16)1 iiidi 66(ti	PWFn =	0.4776		PW =	0.4776		\$2,160
	HMA_SD							
YEAR 3	0 NON-INTERSTATE MILL PVMT & SHLD 2.00"		100.000/	4.000	SQ YD	¢2.00	\$5,007	
	PD PVMT PATCH M&F ADD'L	2 00"	100.00% 2.00%		SQ YD	\$3.00 \$80.72	\$5,067 \$2,745	
	PD SHLD PATCH M&F ADD'L		1.00%		SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25 "		100.00%		SQ YD	\$12.28	\$20,732	
	HMA OVERLAY SHLD 2.25 "		100.00%	0	SQ YD	\$9.07	\$0	
		PWFn =	0.4120		PW =	0.4120	X \$28,544	\$11,760
YEAR 3	5							
12/11/ 0	LONG SHLD JT R&S		100.00%	1,520	LIN FT	\$2.00	\$3,040	
	CNTR LINE JOINT R&S		100.00%		LIN FT	\$2.00	\$0	
	RNDM / THRM CRACK R&S		50.00%		LIN FT	\$2.00	\$836	
	PD PVMT PATCH M&F SURF	PWFn =	0.10%	2	SQ YD PW =	\$80.85 0.3554	\$162 X \$4,038	\$1,435
			0.0001		. ** -	0.0001	λ ψ1,000	ψ1,100
YEAR 4			100					
	LONG SHLD JT R&S		100.00%	,	LIN FT	\$2.00	\$3,040	
	CNTR LINE JOINT R&S RNDM / THRM CRACK R&S		100.00% 50.00%		LIN FT LIN FT	\$2.00 \$2.00	\$0 \$836	
	PD PVMT PATCH M&F SURF		0.50%		SQ YD	\$80.85	\$647	
		PWFn =	0.3066		PW =	0.3066	X \$4,523	\$1,387
							•	\$41,824
	ROUTINE MAINTENANCE ACT	IVITY		0.14	Lane Miles	0.00	\$0	\$0
_							IFE-CYCLE COST	\$41,824
4	5 YEAR LIFE CYCLE	CRFn = 0.0407	7852		MAINTEN	ANCE ANNUA	L COST PER MILE	\$23,702

JOINTED PLAIN CONCRETE PAVEMENT UNBONDED JOINTED PLAIN CONCRETE OVERLAY Figure 54-7.A

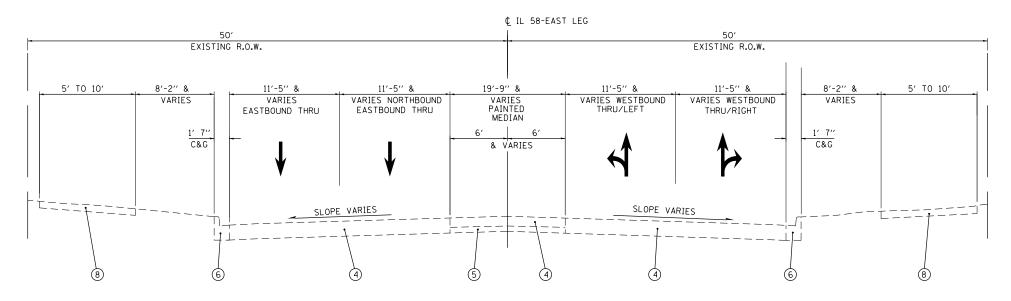
MAINTENANCE COSTS:	ITEM	%	QUANTITY U	INIT	UNIT COST	COST	PRESENT WORTH
100 1111 1111 1110 110 110 110 110 110	112.00	70	QO/MITTI O	J. 411	01111 0001	0001	WORTH
YEAR 10							
TEAK 10	PAVEMENT PATCH CLASS B	0.10%	2 S(Q YD	\$150.00	\$300	
	PWFn =	0.7441	2 0	PW =	0.7441		\$223
	1 WI II =	0.7441		. ** -	0.7 441	Λ ψ500	ΨΖΖΟ
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	3 S(Q YD	\$150.00	\$450	
	PWFn =	0.6419		PW =	0.6419		\$289
						*	•
YEAR 20							
\ <u>-</u>	PAVEMENT PATCH CLASS B	2.00%	34 S	Q YD	\$150.00	\$5,100	
	SHOULDER PATCH CLASS C	0.50%	0 S	Q YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	1,520 LI	IN FT	\$2.00	\$3,040	
	CENTERLINE JT R&S	100.00%	0 LI	IN FT	\$2.00	\$0	
	PWFn =	0.5537		PW =	0.5537	X \$8,140	\$4,507
	1						
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	51 S		\$150.00	\$7,650	
	SHOULDER PATCH CLASS C	1.00%	0 S	Q YD	\$145.00	\$0	
	PWFn =	0.4776		PW =	0.4776	X \$7,650	\$3,654
VEAD 00	NON INTEROTATE						
YEAR 30		4.000/	20.0	0.1/0	# 450.00	# 40.000	
	PAVEMENT PATCH CLASS B	4.00%	68 S0		\$150.00	\$10,200	
	SHOULDER PATCH CLASS C	1.50%		Q YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	1,689 S		\$13.64	\$23,041	
	HMA POLICY OVERLAY 2.5" (SHLD) PWFn =	100.00% 0.4120	0 50	Q YD PW =	\$10.08 0.4120	\$0 V \$22.244	\$42 COE
	FVVFII=	0.4120		PVV =	0.4120	X \$33,241	\$13,695
YEAR 35	NON-INTERSTATE						
TEAR 33	LONGITUDINAL SHLD JT R&S	100.00%	1,520 LI	IN FT	\$2.00	\$3.040	
	CENTERLINE JT R&S	100.00%	,	IN FT	\$2.00	\$0	
	RANDOM CRACK R&S	50.00%	380 LI		\$2.00	\$760	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	400 LI		\$2.00	\$800	
	PD PVMT PATCH M&F HMA 2.50"	0.10%		Q YD	\$83.57	\$167	
	PWFn =	0.3554		PW =	0.3554		\$1,694
YEAR 40	NON-INTERSTATE						
·	PAVEMENT PATCH CLASS B	0.50%	8 S	Q YD	\$150.00	\$1,200	
	LONGITUDINAL SHLD JT R&S	100.00%	1,520 LI	IN FT	\$2.00	\$3,040	
	CENTERLINE JT R&S	100.00%	0 LI	IN FT	\$2.00	\$0	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	600 LI		\$2.00	\$1,200	
	RANDOM CRACK R&S	50.00%	380 LI		\$2.00	\$760	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	8 S(Q YD	\$83.57	\$669	4
	PWFn =	0.3066		PW =	0.3066	X \$6,869 _	\$2,106
							\$26,168
	ROUTINE MAINTENANCE ACTIVITY		0.14 La	ane Miles	\$0.00	\$0	\$0
				MAII	NTENANCE L	IFE-CYCLE COST	\$26,168
45	YEAR LIFE CYCLE CRFn = 0.040	7852		MAINTENA	NCE ANNUAL	COST PER MILE	\$14,829



TYPICAL EXISTING APPROACH ROADWAY CROSS SECTION

ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT WOLF ROAD

VIEW FACING SOUTH TOWARDS ROUNDABOUT (RAB)



TYPICAL EXISTING APPROACH ROADWAY CROSS SECTION

ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT ILLINOIS ROUTE 58 (GOLF ROAD-EAST LEG)

VIEW FACING WEST TOWARDS ROUNDABOUT (RAB)

USER NAME = ahmad.issa	DESIGNED - JMG	REVISED -
	DRAWN - EA	REVISED -
PLOT SCALE = 10.0000 '/ in.	CHECKED - RB	REVISED -
PLOT DATE = 12/22/2016	DATE - 12/22/2016	REVISED -

STATE OF ILLINOIS **DEPARTMENT OF TRANSPORTATION**

TYPICAL	EXISTING WOLF		ACH ROA GOLF RD		 SECTION	
	SHEET	OF	SHEETS	STA.	TO STA.	

SCALE:

SECTION 339 COOK 143 10 7 OFO PRACT NO. 62B16

LEGEND

- 1 EXISTING BITUMINOUS (NOTE 2 2"-3" THICK)
- 2 EXISTING BITUMINOUS OVERLAY (NOTE 2 - 1.5" THICK)
- 3 EXISTING P.C.C. BASE COURSE, (NOTE 2 - 6.5"-8")
- 4 EXISTING BITUMINOUS (NOTE 2 - 12"-15" THICK) (5) EXISTING AGGREGATE (DEPTH UNKNOWN)
- EXISTING B-6.12 C&G (GUTTER OVERLAYED WITH HMA AT SOME LOCATIONS)
- EXISTING B-6.18 C&G (GUTTER IS COVERED BY HMA AT SOME LOCATIONS)
- 8 EXISTING P.C.C. SIDEWALK
- EXISTING GRASS MEDIAN

NOTES

- 1. THE SOUTHBOUND NON -STRIPED PARKING LANE TRANSFORMS INTO A THRU/RIGHT TURN LANE AT THE TRAFFIC CIRCLE APPROACH.
- 2. THE THICKNESSES/MATERIAL TYPE SHOWN ARE FROM HISTORICAL DRAWINGS AND /OR DERIVES FROM PAVEMENT CORES DATA. THE CONTRACTOR SHALL MAKE HIS/HER JUDGEMENT AS TO THE THICKENS'S/MATERIAL TYPE OF PAVEMENT. NO ADDITIONAL COMPENSATION WILL PROVIDED FOR PAYMENT REMOVAL ITEMS IF THE EXISTING PAVEMENT THICKNESSES VARY FROM WHAT IS SHOWN.

TYPICAL EXISTING APPROACH ROADWAY CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT BROADWAY STREET

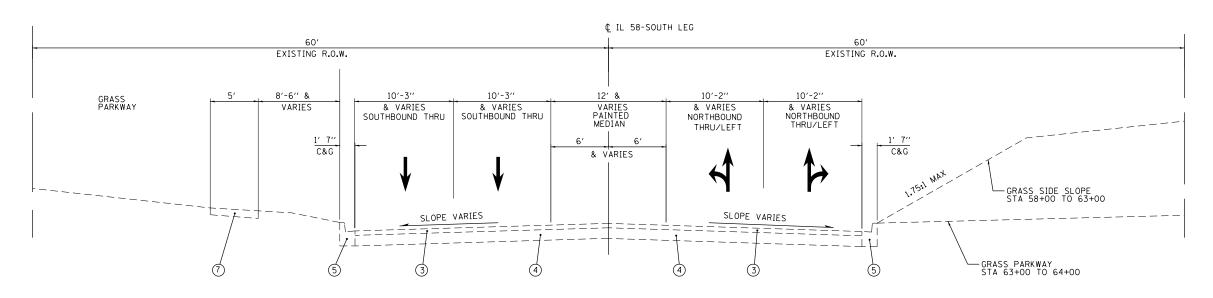
VIEW FACING SOUTH TOWARDS ROUNDABOUT (RAB)

LEGEND

- EXISTING BITUMINOUS (NOTE 1 2.5"-3" THICK)
- 2 EXISTING P.C.C PAVEMENT (NOTE 1 - 8.5"-9" THICK)
- EXISTING BITUMINOUS (NOTE 1 3.5"-5.5" THICK)
- EXISTING P.C.C. PAVEMENT (NOTE 1 7.5"-10.5" THICK)
- (5) EXISTING B-6.12 C&G (GUTTER OVERLAYED WITH HMA AT SOME LOCATIONS)
- EXISTING B-6.18 C&G (GUTTER OVERLAYED WITH HMA AT SOME LOCATIONS)
- (7) EXISTING P.C.C. SIDEWALK
- EXISTING GRASS MEDIAN

NOTE

1. THE THICKNESSES/MATERIAL TYPE SHOWN ARE FROM HISTORICAL DRAWINGS AND /OR DERIVES FROM PAVEMENT CORES DATA. THE CONTRACTOR SHALL MAKE HIS/HER JUDGEMENT AS TO THE THICKENS'S/MATERIAL TYPE OF PAVEMENT. NO ADDITIONAL COMPENSATION WILL PROVIDED FOR PAYMENT REMOVAL ITEMS IF THE EXISTING PAVEMENT THICKNESSES VARY FROM WHAT IS SHOWN.



TYPICAL EXISTING APPROACH ROADWAY CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT ILLINOIS ROUTE 58 (GOLF ROAD-SOUTH LEG)

VIEW FACING WEST TOWARDS ROUNDABOUT (RAB)



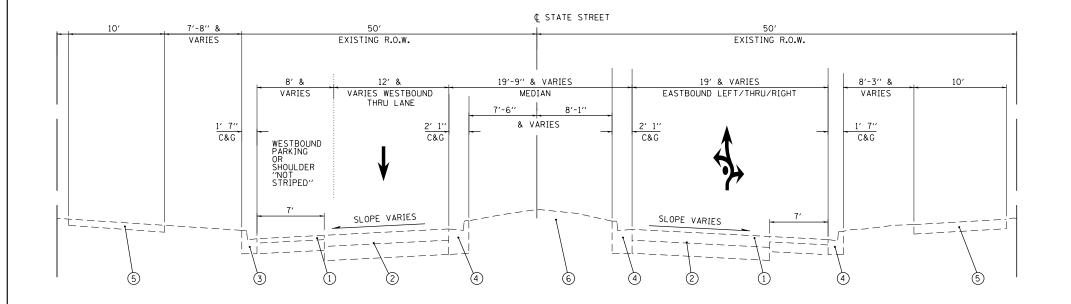
USER NAME = ahmad.issa	DESIGNED	-	JMG	REVISED -
	DRAWN	-	EA	REVISED -
PLOT SCALE = 10.0000 '/ in.	CHECKED	-	RB	REVISED -
PLOT DATE = 12/22/2016	DATE	-	12/22/2016	REVISED -

STATE OF ILLINOIS **DEPARTMENT OF TRANSPORTATION**

SCALE:

TYPICAL	EXISTING A				CROSS SECTION UTH LEG)	
	SHEET	OF	SHEETS	STA.	TO STA.	

	ILLINOIS FED. A	ID PROJECT		
	8	OFOR FACT	NO. 6	52B1
339	583-R	соок	143	11
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHE



TYPICAL EXISTING APPROACH ROADWAY CROSS SECTION

ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT STATE STREET

VIEW FACING EAST TOWARDS ROUNDABOUT (RAB)

HBV ENGINEERING GROUP, LLC

USER NAME = ahmad.issa	DESIGNED	-	JMG	REVISED -
	DRAWN	-	EA	REVISED -
PLOT SCALE = 10.0000 '/ in.	CHECKED	-	RB	REVISED -
PLOT DATE = 12/22/2016	DATE	-	12/22/2016	REVISED -

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

SCALE:

TYPICAL	EXISTING	APPROACH	ROADWAY	CROSS	SECTION				
STATE ST.									
	CHEET	OF CIT	EETC CTA		TO CTA				

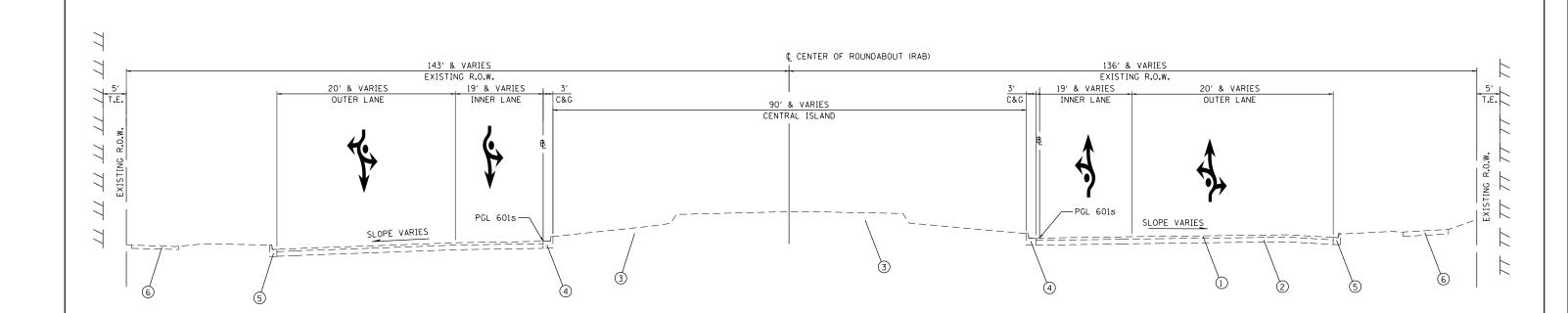
F.A.P. SECTION COUNTY TOTAL SHEETS NO. 339 583-R COOK 143 12 9 0 0 0 16 ACT NO. 62B16

LEGEND

- 1 EXISTING BITUMINOUS (1.5"-2.5" THICK)
- 2 EXISTING P.C.C PAVEMENT (6.5"-8" THICK)
- 3 EXISTING B-6.12 C&G (GUTTER IS COVERED BY HMA AT SOME LOCATIONS)
- (4) EXISTING B-6.18 C&G (GUTTER IS COVERED BY HMA AT SOME LOCATIONS)
- 5 EXISTING P.C.C. SIDEWALK
- 6 EXISTING GRASS MEDIAN

NOTE

1. THE THICKNESSES/MATERIAL TYPE SHOWN ARE FROM HISTORICAL DRAWINGS AND /OR DERIVES FROM PAVEMENT CORES DATA. THE CONTRACTOR SHALL MAKE HIS/HER JUDGEMENT AS TO THE THICKENS'S/MATERIAL TYPE OF PAVEMENT. NO ADDITIONAL COMPENSATION WILL PROVIDED FOR PAYMENT REMOVAL ITEMS IF THE EXISTING PAVEMENT THICKNESSES VARY FROM WHAT IS SHOWN.



TYPICAL EXISTING ROUNDABOUT (RAB) CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) — 5 TOTAL LEGS

CUMBERLAND CIRCLE

LEGEND

- 1 EXISTING BITUMINOUS (NOTE 1 1.5"-2.5" THICK)
- 2 EXISTING P.C.C PAVEMENT (NOTE 1 6.5"-8" THICK)
- 3 EXISTING LANDSCAPED CENTRAL ISLAND
- 4 EXISTING B-6.12 C&G (GUTTER OVERLAEYED WITH HMA AT SOME LOCATIONS)
- (5) EXISTING B-6.18 C&G (GUTTER OVERLAYED WITH HMA AT SOME LOCATIONS)
- 6 EXISTING P.C.C. SIDEWALK

NOTE

1. THE THICKNESSES/MATERIAL TYPE SHOWN ARE FROM HISTORICAL DRAWINGS AND /OR DERIVES FROM PAVEMENT CORES DATA. THE CONTRACTOR SHALL MAKE HIS/HER JUDGEMENT AS TO THE THICKENS'S/MATERIAL TYPE OF PAVEMENT. NO ADDITIONAL COMPENSATION WILL PROVIDED FOR PAYMENT REMOVAL ITEMS IF THE EXISTING PAVEMENT THICKNESSES VARY FROM WHAT IS SHOWN.

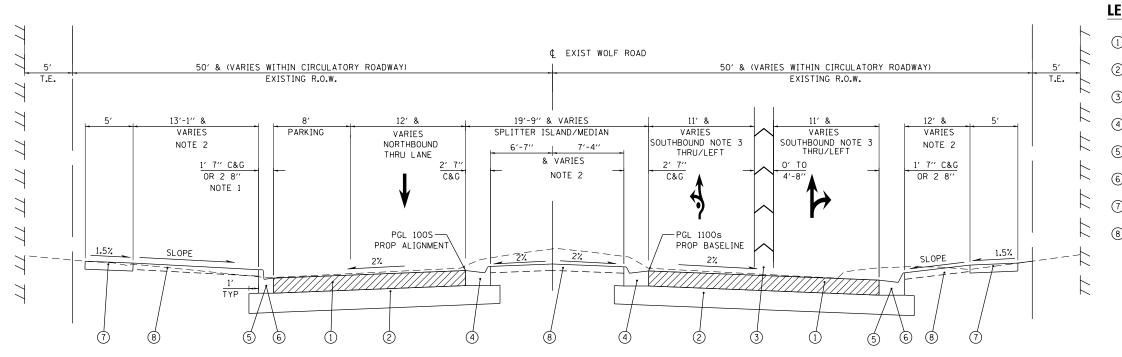


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SCALE:

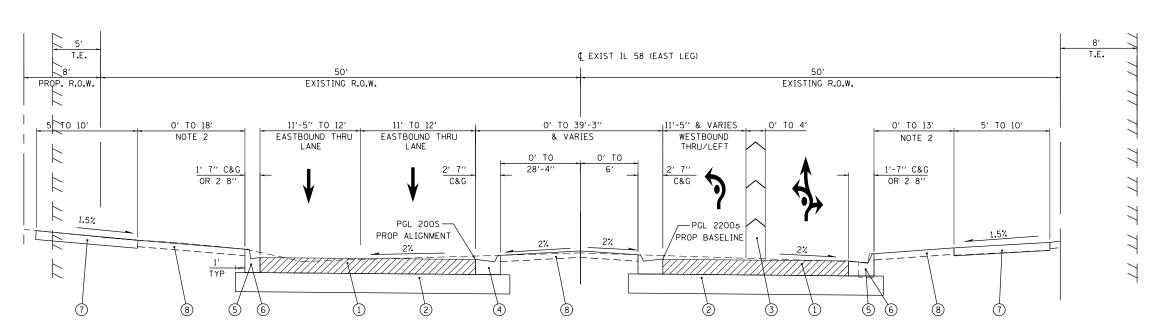
YPICAL	EXISTING	APPROACI	H ROADWA	Y CROSS	SECTION	
		CUMBER	LAND CIRCL	.E		
	SHEET	OF S	SHEETS STA.		TO STA.	

A.P.	SECTION		COUNTY	TOTAL SHEETS	SHE NO
39	583-R		соок	143	13
		10	O(FO) T(BACT	T NO. 6	2B1
	ILLINOIS	FED. A	ID PROJECT		



TYPICAL PROPOSED APPROACH ROADWAY CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT WOLF ROAD

VIEW FACING SOUTH TOWARDS ROUNDABOUT (RAB)



TYPICAL PROPOSED APPROACH ROADWAY CROSS SECTION

ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT ILLINOIS ROUTE 58 (GOLF ROAD-EAST LEG)

VIEW FACING WEST TOWARDS ROUNDABOUT (RAB)

HBM ENGINEERING GROUP, LLC

USER NAME = ahmad.issa	DESIGNED	-	JMG	REVISED -	Γ
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PLOT SCALE = 10.0000 '/ in.	CHECKED	-	RB	REVISED -	l
PLOT DATE = 12/22/2016	DATE	-	12/22/2016	REVISED -	ı

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

SCALE:

TYPICAL		OSED APPRO WOLF RD. &			 SECTION
	SHEET	OF	SHEETS	STA.	TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
339	583-R	соок	143	14
	11	OFO PIBACT	NO. 6	2B16
	ILLINOIS FED. A	D PROJECT		

LEGEND

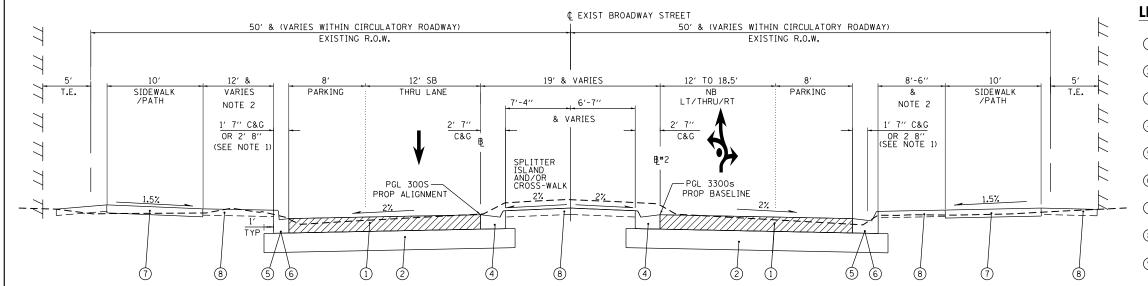
- 1) PROPOSED 9" P.C.C PAVEMENT (JOINTED)
- 2) PROPOSED 12" AGGREGATE SUBGRADE IMPROVEMENT
- (3) PROPOSED STRIPING BETWEEN TURN LANES
- (4) PROPOSED M-4.24 C&G (2'7" WIDE) "SPLITTER ISLAND ONLY"
- (5) PROPOSED M-6.24 C&G (2'8" WIDE) "CIRCULATORY REGION TO CROSS-WALK"
- (6) PROPOSED B-6.12 C&G (1'7" WIDE) "CROSS-WALK TO PROJECT LIMITS"
- 7) PROPOSED P.C.C. SIDEWALK 5"
- 8 PROPOSED FURNISHED AND PLACING TOPSOIL, 4" (SEE LANDSCAPE PLAN FOR SEEDING TYPE OR SODDING)

NOTES

1. TRANSITION FROM M-6.24 C&G TO B-6.12 C&G OVER 15'. CURB AND GUTTER TRANSITION SHALL BE LOCATED SO THAT THE CENTER OF C&G TRANSITION IS COINCIDENT WITH CENTER OF THE ADA SIDEWALK RAMP. THE B-6.12 C&G IS FROM THE PROJECT LIMIT TO THE CROSS-WALK.

2. LANDSCAPED PARKWAY OR SPLITTER ISLAND

3. THE DUAL TURN LANES AS SHOWN ON THIS TYPICAL SECTION WILL TRANSITION TO ONE 12-FOOT THRU LANE & ONE 8-FOOT PARKING LANE (NOT STRIPED).



TYPICAL PROPOSED APPROACH ROADWAY CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT BROADWAY STREET

VIEW FACING NORTHWEST TOWARDS ROUNDABOUT (RAB)

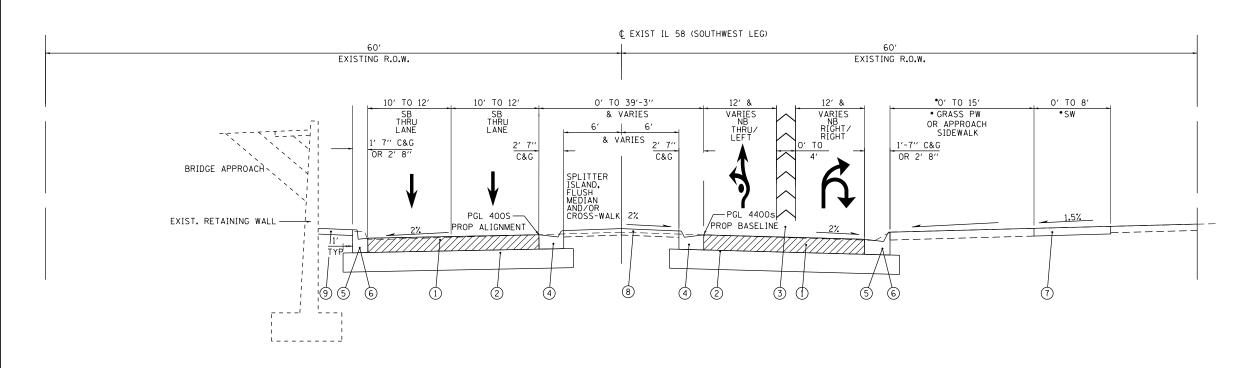
LEGEND

- (1) PROPOSED 9" P.C.C PAVEMENT (JOINTED)
- 2) PROPOSED 12" AGGREGATE SUBGRADE IMPROVEMENT
- (3) PROPOSED STRIPING BETWEEN TURN LANES
- (4) PROPOSED M-4.24 C&G (2'7" WIDE) "SPLITTER ISLAND ONLY"
- 5 PROPOSED M-6.24 C&G (2'8" WIDE) "CIRCULATORY REGION TO CROSS-WALK"
- 6 PROPOSED B-6.12 C&G (1'7" WIDE) "CROSS-WALK TO PROJECT LIMITS"
- (7) PROPOSED P.C.C. SIDEWALK 5"
- 8 PROPOSED FURNISHED AND PLACING TOPSOIL, 4" (SEE LANDSCAPE PLAN FOR SEEDING TYPE OR SODDING)
- (9) PORTLAND CONCRETE SHOULDER 6"

NOTES

1. TRANSITION FROM M-6.24 C&G TO B-6.12 C&G OVER 15'. CURB AND GUTTER TRANSITION SHALL BE LOCATED SO THAT THE CENTER OF C&G TRANSITION IS COINCIDENT WITH CENTER OF THE ADA SIDEWALK RAMP. THE B-6.12 C&G IS FROM THE PROJECT LIMIT TO THE CROSS-WALK.

2. LANDSCAPED PARKWAY OR SPLITTER ISLAND



TYPICAL PROPOSED APPROACH ROADWAY CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT ILLINOIS ROUTE 58 (GOLF ROAD—SOUTHWEST LEG)

VIEW FACING WEST TOWARDS ROUNDABOUT (RAB)

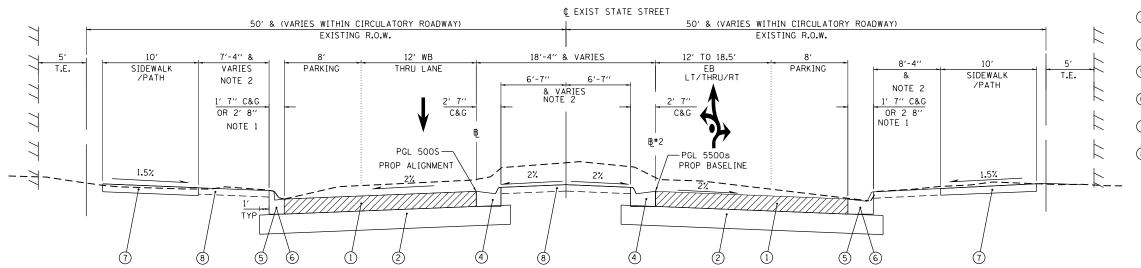


USER NAME = ahmad.issa	DESIGNED	-	JMG	REVISED -
	DRAWN	-	EA	REVISED -
PLOT SCALE = 10.0000 '/ in.	CHECKED	-	RB	REVISED -
PLOT DATE = 12/22/2016	DATE	-	12/22/2016	REVISED -

SCALE:

TYPICAL	PROPOSED BROADWA					
					-,	
	SHEET	OF	SHEETS	STA.	-	O STA.

F.A.P. RTE.	SECTION		COUNTY	TOTAL SHEETS	SHEE NO.
339	583-R		соок	143	15
		12	OFO PIBACT	NO. 6	2B16
	ILLINOIS	FED. A	D PROJECT		



TYPICAL PROPOSED APPROACH ROADWAY CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) AT STATE STREET

VIEW FACING EAST TOWARDS ROUNDABOUT (RAB)

LEGEND

- 1) PROPOSED 9" P.C.C PAVEMENT (JOINTED)
- 2) PROPOSED 12" AGGREGATE SUBGRADE IMPROVEMENT
- 3 PROPOSED STRIPING BETWEEN TURN LANES
- 4) PROPOSED M-4.24 C&G (2'7" WIDE) "SPLITTER ISLAND ONLY"
- (5) PROPOSED M-6.24 C&G (2'8" WIDE) "CIRCULATORY REGION TO CROSS-WALK"
- (6) PROPOSED B-6.12 C&G (1'7" WIDE) "CROSS-WALK TO PROJECT LIMITS"
- 7) PROPOSED P.C.C. SIDEWALK 5"
- PROPOSED FURNISHED AND PLACING TOPSOIL, 4" (SEE LANDSCAPE PLAN FOR SEEDING TYPE OR SODDING)

NOTES

1. TRANSITION FROM M-6.24 C&G TO B-6.12 C&G OVER 15'. CURB AND GUTTER TRANSITION SHALL BE LOCATED SO THAT THE CENTER OF C&G TRANSITION IS COINCIDENT WITH CENTER OF THE ADA SIDEWALK RAMP. THE B-6.12 C&G IS FROM THE PROJECT LIMIT TO THE CROSS-WALK.

2. LANDSCAPED PARKWAY OR SPLITTER ISLAND

SSS TTDX

USER NAME = ahmad.issa	DESIGNED	-	JMG	REVISED -	
	DRAWN	-	EA	REVISED -	
PLOT SCALE = 10.0000 '/ in.	CHECKED	-	RB	REVISED -	
PLOT DATE = 12/22/2016	DATE	-	12/22/2016	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

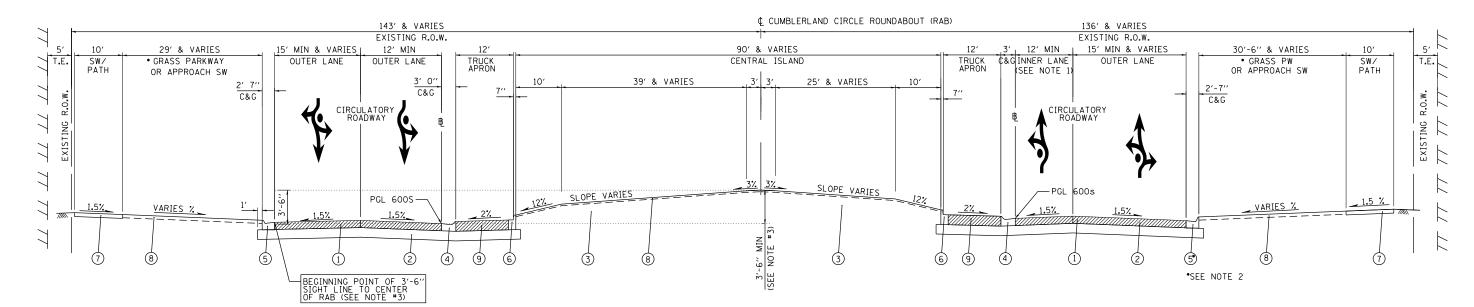
SCALE:

TYPICAL	PROPOSED	APPROACH	ROADWAY	CROSS	SECTION			
STATE ST.								
	CHEET	UE CHEE	TC CTA		TO STA			

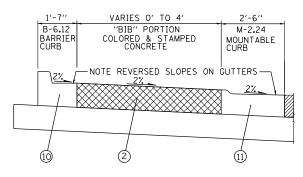
F.A.P. RTE. SECTION COUNTY TOTAL SHEETS NO. 339 583-R COOK 143 16

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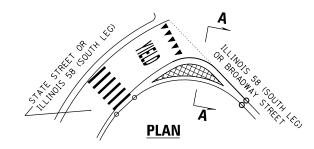
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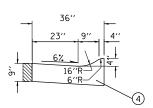
TYPICAL PROPOSED ROUNDABOUT (RAB) CROSS SECTION ILLINOIS ROUTE 58 (CUMBERLAND CIRCLE) — 5 TOTAL LEGS



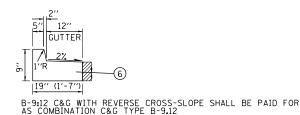
SECTION A-A



DETAIL - TRUCK BIB



COMBINATION CURB AND GUTTER, TYPE M (MODIFIED)



DETAIL COMBINATION C&G B-9.12 REVERSED CROSS SLOPE

LEGEND

- 1 PROPOSED 9" P.C.C PAVEMENT (JOINTED)
- 2) PROPOSED 12" AGGREGATE SUBGRADE IMPROVEMENT
- 3 PROPOSED LANDSCAPED CENTRAL ISLAND
- 4 PROPOSED COMBINATION CURB AND GUTTER, TYPE M (MODIFIED) (3' WIDE) FOR INNER EDGE-OF-PAVEMENT SEE C&G DETAIL
- 5 PROPOSED M-6.24 C&G (2'8" WIDE) FOR "OUTER" EDGE-OF-PAVEMENT
- (6) PROPOSED B-9.12 C&G (WITH REVERSE GUTTER CROSS-SLOPE TO FOLLOW 2% TRUCK APRON)
- 7 PROPOSED P.C.C. SIDEWALK 5"
- (8) PROPOSED FURNISHED AND PLACING TOPSOIL, 4" (SEE LANDSCAPE PLAN FOR SEEDING TYPE OR SODDING)
- 9 PROPOSED 12" COLORED & STAMPED P.C.C. PAVEMENT
- PROPOSED B-6.12 C&G (1'7" WIDE) WITH A REVERSED GUTTER SLOPE OF 2%
- 11) PROPOSED M-2.24 C&G (2'6" WIDE) WITH A REVERSED GUTTER SLOPE OF 2%

NOTES

- 1. A PORTION OF THE RAB LANE CONFIGURATION HAS ONLY ONE CIRCULAR LANE (SEE PLAN FOR LANE CONFIGURATIONS).
- 2. PROIVE TRUCK BIB (SEE PLAN FOR LOCATION AND TRUCK BIB DETAIL ON THIS SHEET.
- 3. A MINIMUM MOUND HEIGHT OF 3'-6" IS REQUIRED AT THE CENTER OF THE RAB TO THE ENTRANCE OF THE "OUTER" CIRCULATORY LANE.

 THE SLOPES IN THE CENTRAL ISLANDS' MOUND CAN BE ADJUSTED TO MEET THE REQUIRED 3'-6" DIMENSION IN THE FIELD.



USER NAME = ahmad.issa	DESIGNED	-	JMG	REVISED -
	DRAWN	-	EA	REVISED -
PLOT SCALE = 20.0000 '/ in.	CHECKED	-	RB	REVISED -
PLOT DATE = 12/22/2016	DATE	-	12/22/2016	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

	TYPICAL	PROPOSED	APPROACH	ROADWAY	CROSS	SECTION	
			CUMBERL	AND CIRCLE			ſ
SCALE:		SHEET	OF SH	EETS STA.		TO STA.	ŀ

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.			
339	583-R	соок	143	17			
		14	OFO PIBACT	. NO. 6	2B16		
ILLINOIS FED. AID PROJECT							